

**NASA
Technical
Memorandum**

NASA TM - 100370

**ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE
(STS-27) LAUNCH**

By G. L. Jasper, D. L. Johnson, and G. W. Batts

Space Science Laboratory

July 1989

**(NASA-TM-100370) ATMOSPHERIC ENVIRONMENT
FOR SPACE SHUTTLE (STS-27) LAUNCH (NASA.
Marshall Space Flight Center) 44 p CSCL 04B**

N89-27316

**Unclas
G3/47 0224709**



National Aeronautics and
Space Administration

George C. Marshall Space Flight Center

ACKNOWLEDGMENTS

The authors wish to thank the personnel of NASA Kennedy Space Center, along with those at the Cape Canaveral Air Force Station and their Computer Sciences Raytheon contractors, for the acquisition and distribution of all related KSC atmospheric data received at MSFC.

Thanks are due to Paul Meyer and Deanna Skow of the Earth Science and Applications Division, MSFC, for their help in extracting atmospheric data and satellite cloud photographs that are used in this report. Also, special thanks to Karen Gilliam and Bill Jeffries of Computer Sciences Corporation for their assistance in processing all the upper air data used in producing the STS-27 final atmospheric data tapes. Finally, appreciation is expressed to Rhonda Blocker of Boeing Computer Support Services for the GRA model, and to Ray Sparks and Kimberly Wilkie of NTI for the computer support in attaining pad measurements.

TABLE OF CONTENTS

	Page
I. INTRODUCTION	1
II. SOURCES OF DATA	1
III. GENERAL SYNOPTIC SITUATION AT LAUNCH TIME	2
IV. SURFACE OBSERVATIONS AT LAUNCH TIME	2
V. UPPER AIR MEASUREMENTS DURING LAUNCH	2
A. Wind Speed	2
B. Wind Direction	3
C. Prelaunch/Launch Wind Profiles	3
D. Thermodynamic Data	3
E. SRB Upper Air and Surface Measurements	3
REFERENCES	35

LIST OF ILLUSTRATIONS

Figure	Title	Page
1.	Surface synoptic chart 2 hr 31 min before launch of STS-27	25
2.	500 mb map 2 hr 31 min before launch of STS-27	26
3.	GOES-7 visible imagery of cloud cover at the launch of STS-27 (1431 UT, December 2, 1988). 500-mb heights (meters) and wind barbs are also included for 1200 UT.....	27
4.	Enlarged view of GOES-7 visible imagery of cloud cover taken at the launch of STS-27 (1431 UT, December 2, 1988). Surface temperatures, isobaric parameters, and wind barbs for 1400 UT are also included	28
5.	Scalar wind speed and direction at launch time of STS-27.....	29
6.	STS-27 prelaunch/launch Jimsphere-measured wind speeds (FPS)	30
7.	STS-27 prelaunch/launch Jimsphere-measured wind directions (degrees)	31
8.	STS-27 prelaunch/launch Jimsphere-measured in-plane component winds (FPS). Reference flight azimuth = 39 deg	32
9.	STS-27 prelaunch/launch Jimsphere-measured out-of-plane component winds (FPS). Reference flight azimuth = 39 deg.....	33
10.	STS-27 temperature profiles versus altitude for launch (ascent)	34

LIST OF TABLES

Table	Title	Page
1.	Selected Atmospheric Observations for the Flights of the Space Shuttle Vehicles.....	4
2.	Systems Used to Measure Upper Air Wind Data for STS-27 Ascent.....	6
3.	Surface Observations at STS-27 Launch Time	7
4.	STS-27 Pre-Launch Through Launch KSC Pad 39B Atmospheric Measurements.....	8
5.	STS-27 Ascent Atmospheric Data Tape.....	9

TECHNICAL MEMORANDUM

ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-27) LAUNCH

I. INTRODUCTION

This report presents an evaluation of the atmospheric environmental data taken during the launch of the Space Shuttle/STS-27 vehicle. The Space Shuttle vehicle was launched from Pad 39B at Kennedy Space Center (KSC), Florida, on a reference bearing of 39-deg east of North, at 1431 UT (931 EST) on December 2, 1988.

This report presents a summary of the atmospheric environment at launch time ($L+0$) of the STS-27, together with the sequence of prelaunch Jimsphere-measured winds aloft profiles from $L-3.42$ hr through liftoff. The general atmospheric situation for the launch and flight area is described, and surface and upper level wind/thermodynamic observations near launch time are given. Since the ship Redstone was unavailable for STS-27 duty, the SRB descent/impact atmospheric data were not taken. However, one can use the STS-27 ascent data for SRB studies as the best substitute.

Previous MSFC-related launch vehicle atmospheric environmental conditions have been published as Appendix A of individual MSFC Saturn Flight Evaluation Working Group reports [1]. Office memorandums have been issued for previous flights giving launch pad wind information. A report has also been published [2] which summarizes most launch atmospheric conditions observed for the past 155 MSFC/ABMA-related vehicle launches through SA-208 (Skylab 4). Reports summarizing ASTP, STS-1 through STS-51L launch conditions are presented in References 3 through 22, respectively. Table 1 gives the atmospheric $L+0$ launch conditions for all the Space Shuttle Missions.

II. SOURCES OF DATA

Atmospheric observational data used in this report were taken from synoptic maps made by the National Weather Service, plus all available surface observations and measurements from around the launch area. Upper air observations were taken from balloon-released instruments sent aloft from Cape Canaveral Air Force Station (CCAFS). High-altitude winds and thermodynamic data were measured by the Super-Loki rocketsondes launched from the CCAFS. Table 2 presents a listing of systems used to obtain the upper level wind profiles used in compiling the final ascent atmospheric data tape. Data cutoff altitudes are also given in Table 2.

III. GENERAL SYNOPTIC SITUATION AT LAUNCH TIME

A very cool dome of high pressure was building southeastward over the KSC area during the launch of STS-27. Surface winds were light and mostly from the northwest during the countdown. Figure 1 presents the surface map 2 hr and 31 min before launch of STS-27. Strong westerly winds dominated the flow aloft over the KSC area. Figure 2 shows the wind aloft conditions at the 500 mb level 2 hr and 31 min before launch.

Clouds were scattered over Florida prior to the launch of STS-27. Figure 3 depicts the GOES-7 visible picture at 1431 UT (the time of liftoff) with the 500-mb heights and wind barbs superimposed. Figure 4 presents an up-close visible shot of the Florida peninsula as recorded by GOES-7, taken also at 1431 UT.

Strong winds aloft produced load exceedances at high altitudes which were responsible for a 24-hr delay of STS-27.

IV. SURFACE OBSERVATIONS AT LAUNCH TIME

Surface observations at launch time for selected KSC locations are given in Table 3. Included are pad 39B, shuttle runway, and CCAFS balloon release station observations. Neither precipitation nor lightning was observed at launch time.

Table 4 presents pad 39B wind data along with other standard hourly atmospheric measurements and sky observations for the 6-hr period prior to launch of STS-27. Values for wind speed and direction are given for the 18 m (60 ft) pad light pole level.

V. UPPER AIR MEASUREMENTS DURING LAUNCH

The FPS-16 Jimsphere (1446 UT), MSS Rawinsonde (1630 UT), Super-Loki Rocketsonde (1601 UT), and Super-Loki Robin (1533 UT) systems were used to measure the upper level wind and thermodynamic parameters for STS-27 launch. At altitudes above the rocket-measured data, the Global Reference Atmosphere (GRA) [23] parameters for December KSC conditions were used. A tabulation of the STS-27 final atmospheric data for ascent is presented in Table 5 which lists the wind and thermodynamic parameters versus altitude. A brief summary of parameters is given in the following paragraphs.

A. Wind Speed

At launch time wind speeds were 25.5 ft/sec (15.1 kn) at 60 ft and increased to a maximum of 187 ft/sec (110.7 kn) at 40,200 ft (12,253 m). The next measurable maximum wind speed was 263 ft/sec (444.2 kn) at 157,000 ft (47,854 m) and 158,000 ft (48,158 m). The winds remained below this maximum through the 253,000 ft (77,114 m) level which was the altitude of the last measurable wind speed. The left side of Figure 5 shows a plot of wind speed versus altitude.

B. Wind Direction

The 60-ft wind direction was from the northwest (314 deg) at launch time and shifted to a northerly component at 1400 ft (427 m). The winds fluctuated from the north to northeast to around 5600 ft (1707 m) where they began to return to a more northwesterly direction. Winds were north to northwesterly above this level to about 21,000 ft (6401 m) where winds became westerly. Above this level winds oscillated from west to west southwest. Winds returned to a northerly component around 253,000 ft (77,114 m) which was the last measurable directional height. Figure 5 depicts the complete wind versus altitude profile specifying wind direction on the right side.

C. Prelaunch/Launch Wind Profiles

Prelaunch/launch wind profiles given in Figures 6 through 9 were measured by the Tim sphere FPS-16 system. Data is shown for four measurement periods beginning at L-3.4 hr and extending through L + 15 min.

The wind speed and direction profiles for the L-3.4 hr period prior to and including L + 15 min are shown in Figures 6 and 7. The in-plane and out-of-plane profiles are shown in Figures 8 and 9. The in-plane component wind speeds were less than the December mean wind values about 20,000 ft (6096 m) and greater than the mean wind value above this altitude. The out-of-plane wind speeds were generally greater than the December mean values but well within the 90 percent profile envelope.

D. Thermodynamic Data

The thermodynamic data, taken at STS-27 launch time, consisted of atmospheric temperature, dew-point temperature, pressure, and density. These data have been compiled as the STS-27 ascent atmospheric data and are presented in Table 5. The vertical structure of temperature and dew-point temperature for STS-27 ascent are shown graphically versus altitude in Figure 10.

E. SRB Upper Air and Surface Measurements

As has been mentioned in the introduction, since there was no ship available, an SRB descent atmospheric data tape has not been constructed. The tabular values for the ascent atmospheric tape, as presented in Table 5, should be used for SRB descent/impact studies since it is the closest measured data source.

TABLE 1. SELECTED ATMOSPHERIC OBSERVATIONS FOR THE FLIGHTS OF THE
SPACE SHUTTLE VEHICLES

Vehicle Data				Surface Observations				Inflight Conditions Max. Wind Below 60,000 ft			Count Down and Launch Comments of Meteorological Significance
Seq. No.	Vehicle No.	Launch Date	Time (EST) Nearest Minute	Thermodynamic ^a		Wind ^b		Alt. (ft)	Speed (ft/sec)	Dir. (deg)	
				Press. ^c N/cm ²	Temp. (°C)	Rel. Hum. (%)	Speed (ft/sec)	Dir. (deg)			
1	STS-1 Columbia	4/12/81	0700	10.234 ^d	21	82	11.8 15.2	125 120	44,300	98	250
2	STS-2 Columbia	11/12/81	1010	10.166	23	61	27.0 27.0	345 335	36,300	158	286
3	STS-3 Columbia	3/22/82	1100	10.160	24	71	7.0 ^e 8.0 ^e	50 ^e 145 ^e	45,000	119	250
4	STS-4 Columbia	6/27/82	1100 ^f	10.200	29	70	5.8 ^g 4.9 ^g	133 ^g 141 ^g	47,900	37	329
5	STS-5 Columbia	11/11/82	0719	10.227	22	68	22.0 35.0	90 90	40,600	146	336
6	STS-6 Challenger	4/4/83	1330	10.183	23	55	12.7 16.4	63 55	46,100	155	277
7	STS-7 Challenger	6/18/83	0733 ^f	10.146	25	80	5.9 ^e 10.3 ^e	10 ^e 350 ^e	45,900	76	278
8	STS-8 Challenger	8/30/83	0232 ^f	10.111	24	97	8.8 14.0	269 268	45,100	30	349
9	STS-9 (SL-1) Columbia	11/28/83	1100	10.153	24	83	19.1 32.0	183 190	47,100	117	252
10	STS-11 (41-B) Challenger	2/3/84	0800	10.173	17	75	0.0 NA	0 NA	38,200	143	288
11	STS-13 (41-C) Challenger	4/6/84	0858	10.149	16	56	21.5 18.6	320 275	37,700	176	289
12	STS-41D Discovery	8/30/84	0842 ^f	10.172	26	81	3.0 3.6	106 39	40,300	44	270
13	STS-41G Challenger	10/5/84	0703 ^f	10.210	23	60	16.5 14.8	73 58	40,600	78	303
14	STS-51A Discovery	11/8/84	0715	10.227	20	59	23.0 31.1	24 10	33,100	131	272

1 day delay due to excessive
wind loads, calculated at high
altitudes.

17 min countdown
delay due to adverse
weather conditions.

Wind directional
change observed
at Pad just prior
to L+0. Onset of
sea breeze.

TABLE 1. (Concluded)

Vehicle Data ^h				Surface Observations					Inflight Conditions Max. Wind Below 60,000 ft			Count Down and Launch Comments of Meteorological Significance
Seq. No.	Vehicle No.	Launch Date	Time (EST) Nearest Minute	Thermodynamic ^a			Wind ^b		Alt. (ft)	Speed (ft/sec)	Dir. (deg)	
				Press. ^c N/cm ²	Temp. ^c (°C)	Rel. Hum. (%)	Speed (ft/sec)	Dir. (deg)				
15	STS-51C Discovery	1/24/85	1450	10.173	18	46	17.1 15.5	228 253	42,900	199	265	1 day delay due to extreme cold surface temperatures.
16	STS-51D Discovery	4/12/85	1359	10.257	21	55	19.9 22.3	82 82	42,600	134	265	55-min delay due to a ship in the SRB impact area, and concerns over potential weather related impacts (cloud cover).
17	STS-51B Challenger	4/29/85	1202 ^f	10.128	27	65	11.5 18.4	005 337	32,900 40,700	68 68	320 297	
18	STS-51G Discovery	6/17/85	0733 ^f	10.201	23	91	2.9 11.8	201 206	40,100 46,700	55 55	298 302	
19	STS-51F Challenger	7/29/85	1700 ^f	10.174	28	72	14.9 13.4	101 113	48,000	53	035	(20) 8/24 launch scrub due to unacceptable weather in launch area. Rain during countdown.
20	STS-51I Discovery	8/27/85	0658 ^f	10.225	24	86	14.2 16.6	073 070	41,000	43	123	
21	STS-51J Atlantis	10/3/85	1115 ^f	10.185	28	79	17.0 13.7	213 171	48,000	48	283	(24) 1/7 launch scrub due to unacceptable weather at TAW sites. 1/10 launch scrub due to heavy rain in launch area.
22	STS-61A Challenger	10/30/85	1200	10.059	28	72	12.7 14.1	217 174	43,000	81	218	
23	STS-61B Atlantis	11/26/85	1929	10.202	23	81	10.1 10.4	165 112	49,300	75	270	(25) 1/26 launch scrub due to in-part to potential bad weather associated with frontal passage. 1/27 launch scrub due to strong cross winds at X68. 1/28 2-hr delay due to in-part to cold early morning temperatures.
24	STS-61C Columbia	1/12/86	0655	10.206	12	84	15.4 18.6	323 342	40,000	221	263	
25 ^j	STS-51L ⁱ Challenger	1/28/86	1138	10.253	3	27	20.1 15.3	331 262	42,000	174	264	
26 ^j	STS-26 Discovery	9/29/88	1137 ^f	10.182	29	56	13.7 13.5	058 047	53,100	44	304	(26) 1 hr and 37 min delay due to light winds.
27 ^j	STS-27 Atlantis	12/2/88	930	10.270	14	50	25.5 22.0	314 352	40,200	187	245	(27) 1 day delay due to excessive wind loads, calculated at high altitudes.

a. Pad 39A thermodynamic measurements taken at approximately 1.2 m (4 ft) above natural grade at camera site No. 3.

b. 1 min average prior to L+0 of 60 ft PLP (listed first) and 275 ft FSS winds measured above natural grade. 275 ft FSS wind measurement can possibly be influenced by surrounding pad structures and thermal balance. 60 ft PLP wind data should not have this potential problem.

c. Pressure measurement applicable to 21 ft above MSL unless otherwise indicated.

d. Pressure measurement applicable to 14 ft above MSL.

e. 10 sec average prior to L+0.

f. Eastern Daylight Time.

g. 30 sec average prior to L+0.

h. All vehicles launched from LC 39A except where noted.

i. Shuttle exploded in flight.

j. Vehicle launched from 39B.

TABLE 2. SYSTEMS USED TO MEASURE UPPER AIR WIND DATA FOR STS-27 ASCENT

Type of Data	Date: December 2, 1988		Portion of Data Used			
	Release Time		Start		End	
	Time (UT) (hr/min)	Time After L+0 (min)	Altitude m (ft)	Time After L+0 (min)	Altitude m (ft)	Time After L+0 (min)
FPS-16 Jimsphere	14:46	15	6 (21)	15	16,764 (55,000)	70
MSS Rawinsonde	16:30	119	17,069 (56,000)	175	29,261 (96,000)	215
Super-Loki Rocketsonde (Datasonde)	16:01	90	67,361 (221,000)	90	29,566 (97,000)	135
Super-Loki Rocketsonde (Robin)	15:33	62	77,114 (253,000)	62	67,056 (222,000)	71

TABLE 3. SURFACE OBSERVATIONS AT STS-27 LAUNCH TIME

Location ^a	Time After L+0 (min)	Pressure (MSL) N/cm ² (psia)	Temperature K (°F)	Dew Point K (°F)	Relative Humidity (%)	Visibility km (miles)	Sky Cover			Wind	
							Cloud Amount*	Cloud Type	Height of Base Meters (ft)	Speed ft/sec (kt)	Direction (deg)
NASA Space Shuttle Runway X68e Winds Measured at 10.4 m (34 ft)	0	10.278 (14.907)	288.2 (59.0)	274.8 (35.0)	40	16 (10)	2	Strato-cumulus	1311 (4300)	20.3 (12.0)	340
CCAFS XMR ^c Surface Measurements	-1	10.274 (14.901)	288.2 (59.0)	279.3 (43.0)	55	16 (10)	2	Cirrus	9144 (30,000)	16.9 (10.0)	330
Pad 39B ^d Lightpole NW 18.3 m (60.0 ft)	0	10.278 (14.896)	287.1 (57.0)	276.8 (38.6)	50	-	-	-	-	25.5 (15.1)	314
Pad 39A FSS (Top NW) 83.8 m (275 ft)	0	-	-	-	-	-	-	-	-	22.0 ^b (13.1)	352 ^b

*4/10 total sky cover reported at both X68 and XMR.

a. Altitudes of measurements are above natural grade, except where noted.

b. Approximately 5 min average prior to L+0.

c. Balloon release site.

d. Pad 39B thermodynamic measurements are taken at camera site No. 3, approximately 6.4 m (21 ft) above MSL.

e. Official STS-27 sky observational site.

TABLE 4. STS-27 PRE-LAUNCH THROUGH LAUNCH KSC PAD 39B
ATMOSPHERIC MEASUREMENTS^a

Hourly Atmospheric Measurements						Sky Condition ^b			
2 December 1988 Time UT	Temperature (°F)	Dew Point (°F)	Relative Humidity (%)	60' Level (NW)		Clouds	Total Sky Cover	Vis. (mi.)	Other Remarks
				WS Kt	WD°				
0900	55	30	49	11	319	Clear	0	10	
1000	52	34	49	10	300	Clear	0	10	
1100	51	32	48	12	300	Scattered at 3500 ft	1/10	10	
1200	50	33	50	13	300	Scattered at 5,000 and 30,000 ft	2/10	10	
1300	50	39	52	12	301	Scattered at 5,000 and 30,000 ft	3/10	10	
1400	55	39	54	14	309	Scattered at 5,000 and 30,000 ft	3/10	10	
L+0 ^c 1431	57	39	50	15	314	Scattered at 4,300 and 30,000 ft	4/10	10	

a. Hourly pad observations (obtained via MSFC/HOSC) averaged over 1 min, centered on the hour.

b. Sky observations taken at the Shuttle runway site X68.

c. L+0 PAD wind and thermodynamic parameters obtained from HSC strip charts. The NW anemometer was used at 60 ft for L+0 wind conditions approximately 1 min average prior to L+0.

TABLE 5. STS-27 ASCENT ATMOSPHERIC DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
21.	22.00	320.00	13.90	0.1027E+04	0.1243E+04	3.70
100.	24.00	330.00	13.85	0.1024E+04	0.1239E+04	3.64
200.	23.00	340.00	13.79	0.1020E+04	0.1235E+04	3.57
300.	23.13	340.00	13.73	0.1017E+04	0.1231E+04	3.50
400.	24.15	328.00	13.67	0.1013E+04	0.1227E+04	3.43
500.	25.13	327.00	13.61	0.1009E+04	0.1223E+04	3.36
600.	24.80	331.00	13.55	0.1006E+04	0.1218E+04	3.29
700.	27.00	331.00	13.48	0.1002E+04	0.1214E+04	3.21
800.	27.69	336.00	13.42	0.9983E+03	0.1210E+04	3.14
900.	25.82	341.00	13.36	0.9946E+03	0.1206E+04	3.07
1000.	22.11	338.00	13.30	0.9910E+03	0.1202E+04	3.00
1100.	25.33	331.00	12.95	0.9874E+03	0.1199E+04	2.92
1200.	26.51	330.00	12.60	0.9838E+03	0.1196E+04	2.84
1300.	27.33	332.00	12.25	0.9803E+03	0.1193E+04	2.76
1400.	30.54	350.00	11.90	0.9767E+03	0.1190E+04	2.68
1500.	31.40	355.00	11.55	0.9732E+03	0.1187E+04	2.60
1600.	33.92	350.00	11.20	0.9696E+03	0.1185E+04	2.52
1700.	33.76	353.00	10.85	0.9661E+03	0.1182E+04	2.44
1800.	30.87	359.00	10.50	0.9626E+03	0.1179E+04	2.36
1900.	31.04	4.00	10.15	0.9591E+03	0.1176E+04	2.28
2000.	31.73	6.00	9.80	0.9556E+03	0.1173E+04	2.20
2100.	31.40	7.00	9.54	0.9521E+03	0.1170E+04	2.19
2200.	31.04	7.00	9.28	0.9486E+03	0.1167E+04	2.18
2300.	29.04	12.00	9.02	0.9451E+03	0.1163E+04	2.17
2400.	29.69	14.00	8.76	0.9416E+03	0.1160E+04	2.16
2500.	29.20	9.00	8.50	0.9382E+03	0.1157E+04	2.15
2600.	29.53	6.00	8.24	0.9347E+03	0.1154E+04	2.14
2700.	32.25	7.00	7.98	0.9313E+03	0.1151E+04	2.13
2800.	38.48	8.00	7.72	0.9279E+03	0.1148E+04	2.12
2900.	37.14	7.00	7.46	0.9245E+03	0.1144E+04	2.11
3000.	35.60	10.00	7.20	0.9211E+03	0.1141E+04	2.10
3100.	35.10	16.00	6.92	0.9177E+03	0.1138E+04	2.09
3200.	35.10	17.00	6.64	0.9143E+03	0.1135E+04	2.08
3300.	32.41	21.00	6.36	0.9109E+03	0.1132E+04	2.07
3400.	28.35	16.00	6.08	0.9075E+03	0.1129E+04	2.06
3500.	28.02	13.00	5.80	0.9041E+03	0.1126E+04	2.05
3600.	27.49	8.00	5.52	0.9008E+03	0.1123E+04	2.04
3700.	30.22	12.00	5.24	0.8975E+03	0.1120E+04	2.03
3800.	35.60	8.00	4.96	0.8941E+03	0.1117E+04	2.02
3900.	40.52	8.00	4.68	0.8908E+03	0.1114E+04	2.01
4000.	39.83	7.00	4.40	0.8875E+03	0.1111E+04	2.00
4100.	38.65	18.00	4.25	0.8842E+03	0.1107E+04	1.36
4200.	33.92	18.00	4.10	0.8809E+03	0.1104E+04	0.72
4300.	37.14	20.00	3.95	0.8776E+03	0.1100E+04	0.08
4400.	36.78	25.00	3.80	0.8743E+03	0.1097E+04	-0.56
4500.	37.96	21.00	3.65	0.8711E+03	0.1094E+04	-1.20
4600.	35.60	22.00	3.50	0.8678E+03	0.1090E+04	-1.84
4700.	36.12	28.00	3.35	0.8646E+03	0.1087E+04	-2.48
4800.	36.61	29.00	3.20	0.8613E+03	0.1083E+04	-3.12
4900.	35.27	33.00	3.05	0.8581E+03	0.1080E+04	-3.76

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
5000.	38.32	28.00	2.90	0.8549E+03	0.1077E+04	-4.40
5100.	35.10	30.00	3.48	0.8517E+03	0.1071E+04	-5.38
5200.	36.45	26.00	4.06	0.8486E+03	0.1065E+04	-6.36
5300.	41.70	16.00	4.64	0.8454E+03	0.1059E+04	-7.34
5400.	44.06	6.00	5.22	0.8423E+03	0.1053E+04	-8.32
5500.	44.23	357.00	5.80	0.8392E+03	0.1047E+04	-9.30
5600.	43.21	348.00	6.38	0.8361E+03	0.1041E+04	-10.28
5700.	44.88	346.00	6.96	0.8330E+03	0.1035E+04	-11.26
5800.	44.72	349.00	7.54	0.8299E+03	0.1029E+04	-12.24
5900.	48.10	349.00	8.12	0.8268E+03	0.1023E+04	-13.22
6000.	49.11	347.00	8.70	0.8237E+03	0.1017E+04	-14.20
6100.	52.13	343.00	8.67	0.8207E+03	0.1014E+04	-14.04
6200.	55.51	340.00	8.64	0.8177E+03	0.1010E+04	-13.88
6300.	51.80	342.00	8.61	0.8147E+03	0.1006E+04	-13.72
6400.	47.08	344.00	8.58	0.8117E+03	0.1003E+04	-13.56
6500.	46.92	339.00	8.55	0.8087E+03	0.9991E+03	-13.40
6600.	52.66	338.00	8.52	0.8057E+03	0.9955E+03	-13.24
6700.	52.33	336.00	8.49	0.8028E+03	0.9919E+03	-13.08
6800.	51.97	336.00	8.46	0.7998E+03	0.9884E+03	-12.92
6900.	53.84	336.00	8.43	0.7969E+03	0.9848E+03	-12.76
7000.	52.49	338.00	8.40	0.7939E+03	0.9813E+03	-12.60
7100.	48.43	335.00	8.36	0.7910E+03	0.9778E+03	-12.72
7200.	50.30	331.00	8.32	0.7881E+03	0.9743E+03	-12.84
7300.	48.95	332.00	8.28	0.7852E+03	0.9709E+03	-12.96
7400.	47.41	326.00	8.24	0.7823E+03	0.9675E+03	-13.08
7500.	46.92	323.00	8.20	0.7794E+03	0.9641E+03	-13.20
7600.	46.92	325.00	8.16	0.7766E+03	0.9606E+03	-13.32
7700.	44.39	325.00	8.12	0.7737E+03	0.9572E+03	-13.44
7800.	46.59	326.00	8.08	0.7708E+03	0.9539E+03	-13.56
7900.	48.79	329.00	8.04	0.7680E+03	0.9505E+03	-13.68
8000.	45.73	332.00	8.00	0.7652E+03	0.9471E+03	-13.80
8100.	46.59	331.00	7.87	0.7624E+03	0.9441E+03	-13.90
8200.	44.39	329.00	7.74	0.7595E+03	0.9410E+03	-14.00
8300.	42.19	336.00	7.61	0.7567E+03	0.9380E+03	-14.10
8400.	42.36	334.00	7.48	0.7540E+03	0.9350E+03	-14.20
8500.	47.77	335.00	7.35	0.7512E+03	0.9320E+03	-14.30
8600.	48.10	336.00	7.22	0.7484E+03	0.9290E+03	-14.40
8700.	42.68	337.00	7.09	0.7456E+03	0.9260E+03	-14.50
8800.	44.39	337.00	6.96	0.7429E+03	0.9230E+03	-14.60
8900.	46.23	342.00	6.83	0.7401E+03	0.9200E+03	-14.70
9000.	43.54	346.00	6.70	0.7374E+03	0.9171E+03	-14.80
9100.	45.41	344.00	6.62	0.7347E+03	0.9139E+03	-14.87
9200.	47.08	347.00	6.54	0.7320E+03	0.9108E+03	-14.94
9300.	45.05	349.00	6.46	0.7293E+03	0.9077E+03	-15.01
9400.	43.04	348.00	6.38	0.7265E+03	0.9046E+03	-15.08
9500.	44.88	346.00	6.30	0.7239E+03	0.9015E+03	-15.15
9600.	46.42	350.00	6.22	0.7212E+03	0.8984E+03	-15.22
9700.	44.88	351.00	6.14	0.7185E+03	0.8953E+03	-15.29
9800.	45.73	349.00	6.06	0.7158E+03	0.8923E+03	-15.36
9900.	47.93	350.00	5.98	0.7132E+03	0.8892E+03	-15.43

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
10000.	46.92	353.00	5.90	0.7105E+03	0.8862E+03	-15.50
10100.	46.75	351.00	5.73	0.7079E+03	0.8834E+03	-15.62
10200.	48.10	349.00	5.56	0.7053E+03	0.8807E+03	-15.74
10300.	50.62	353.00	5.39	0.7026E+03	0.8779E+03	-15.86
10400.	51.97	354.00	5.22	0.7000E+03	0.8752E+03	-15.98
10500.	51.80	355.00	5.05	0.6974E+03	0.8725E+03	-16.10
10600.	57.87	358.00	4.88	0.6948E+03	0.8698E+03	-16.22
10700.	58.73	0.00	4.71	0.6922E+03	0.8671E+03	-16.34
10800.	58.89	1.00	4.54	0.6897E+03	0.8644E+03	-16.46
10900.	63.12	1.00	4.37	0.6871E+03	0.8617E+03	-16.58
11000.	62.27	3.00	4.20	0.6846E+03	0.8590E+03	-16.70
11100.	61.42	1.00	4.00	0.6820E+03	0.8565E+03	-16.87
11200.	61.42	358.00	3.80	0.6794E+03	0.8539E+03	-17.04
11300.	60.76	359.00	3.60	0.6769E+03	0.8513E+03	-17.21
11400.	57.38	356.00	3.40	0.6744E+03	0.8487E+03	-17.38
11500.	58.40	355.00	3.20	0.6718E+03	0.8462E+03	-17.55
11600.	58.89	355.00	3.00	0.6693E+03	0.8436E+03	-17.72
11700.	57.05	356.00	2.80	0.6668E+03	0.8411E+03	-17.89
11800.	57.71	351.00	2.60	0.6643E+03	0.8385E+03	-18.06
11900.	56.89	351.00	2.40	0.6618E+03	0.8360E+03	-18.23
12000.	49.28	351.00	2.20	0.6593E+03	0.8335E+03	-18.40
12100.	51.31	347.00	1.98	0.6569E+03	0.8310E+03	-18.57
12200.	53.84	347.00	1.76	0.6544E+03	0.8286E+03	-18.74
12300.	49.97	346.00	1.54	0.6519E+03	0.8261E+03	-18.91
12400.	49.11	345.00	1.32	0.6494E+03	0.8236E+03	-19.08
12500.	50.13	339.00	1.10	0.6470E+03	0.8212E+03	-19.25
12600.	49.77	343.00	0.88	0.6445E+03	0.8188E+03	-19.42
12700.	44.72	338.00	0.66	0.6421E+03	0.8163E+03	-19.59
12800.	44.06	334.00	0.44	0.6397E+03	0.8139E+03	-19.76
12900.	46.59	331.00	0.22	0.6373E+03	0.8115E+03	-19.93
13000.	43.70	333.00	0.00	0.6349E+03	0.8091E+03	-20.10
13100.	41.17	328.00	-0.23	0.6325E+03	0.8067E+03	-20.28
13200.	42.68	326.00	-0.46	0.6300E+03	0.8043E+03	-20.46
13300.	43.86	324.00	-0.69	0.6276E+03	0.8019E+03	-20.64
13400.	40.52	323.00	-0.92	0.6253E+03	0.7996E+03	-20.82
13500.	38.81	316.00	-1.15	0.6229E+03	0.7972E+03	-21.00
13600.	41.70	317.00	-1.38	0.6205E+03	0.7949E+03	-21.18
13700.	42.03	315.00	-1.61	0.6181E+03	0.7925E+03	-21.36
13800.	37.96	313.00	-1.84	0.6158E+03	0.7902E+03	-21.54
13900.	37.80	309.00	-2.07	0.6135E+03	0.7878E+03	-21.72
14000.	36.29	307.00	-2.30	0.6111E+03	0.7855E+03	-21.90
14100.	36.61	310.00	-2.57	0.6088E+03	0.7833E+03	-22.11
14200.	35.43	304.00	-2.84	0.6064E+03	0.7811E+03	-22.32
14300.	35.43	303.00	-3.11	0.6041E+03	0.7788E+03	-22.53
14400.	36.98	303.00	-3.38	0.6018E+03	0.7766E+03	-22.74
14500.	35.43	301.00	-3.65	0.5995E+03	0.7744E+03	-22.95
14600.	35.60	296.00	-3.92	0.5972E+03	0.7722E+03	-23.16
14700.	39.34	294.00	-4.19	0.5949E+03	0.7701E+03	-23.37
14800.	39.83	295.00	-4.46	0.5926E+03	0.7679E+03	-23.58
14900.	39.50	292.00	-4.73	0.5903E+03	0.7657E+03	-23.79

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
15000.	41.34	293.00	-5.00	0.5881E+03	0.7635E+03	-24.00
15100.	43.04	293.00	-5.28	0.5858E+03	0.7614E+03	-24.22
15200.	40.68	292.00	-5.56	0.5835E+03	0.7592E+03	-24.44
15300.	45.73	287.00	-5.84	0.5812E+03	0.7571E+03	-24.66
15400.	49.44	290.00	-6.12	0.5790E+03	0.7549E+03	-24.88
15500.	49.11	293.00	-6.40	0.5767E+03	0.7528E+03	-25.10
15600.	50.30	290.00	-6.68	0.5745E+03	0.7507E+03	-25.32
15700.	55.71	290.00	-6.96	0.5723E+03	0.7486E+03	-25.54
15800.	55.35	291.00	-7.24	0.5701E+03	0.7465E+03	-25.76
15900.	58.56	289.00	-7.52	0.5678E+03	0.7443E+03	-25.98
16000.	62.80	288.00	-7.80	0.5656E+03	0.7423E+03	-26.20
16100.	58.73	286.00	-8.08	0.5634E+03	0.7401E+03	-26.42
16200.	61.42	283.00	-8.36	0.5612E+03	0.7380E+03	-26.64
16300.	59.25	285.00	-8.64	0.5590E+03	0.7359E+03	-26.86
16400.	59.91	283.00	-8.92	0.5568E+03	0.7338E+03	-27.08
16500.	59.58	286.00	-9.20	0.5546E+03	0.7317E+03	-27.30
16600.	55.02	288.00	-9.48	0.5525E+03	0.7296E+03	-27.52
16700.	56.53	288.00	-9.76	0.5503E+03	0.7275E+03	-27.74
16800.	56.89	289.00	-10.04	0.5481E+03	0.7255E+03	-27.96
16900.	56.04	289.00	-10.32	0.5460E+03	0.7234E+03	-28.18
17000.	57.87	291.00	-10.60	0.5439E+03	0.7213E+03	-28.40
17100.	55.18	292.00	-10.80	0.5417E+03	0.7190E+03	-28.59
17200.	54.33	292.00	-11.00	0.5396E+03	0.7167E+03	-28.78
17300.	53.35	293.00	-11.20	0.5374E+03	0.7144E+03	-28.97
17400.	52.99	292.00	-11.40	0.5353E+03	0.7122E+03	-29.16
17500.	55.71	291.00	-11.60	0.5332E+03	0.7099E+03	-29.35
17600.	50.95	292.00	-11.80	0.5311E+03	0.7076E+03	-29.54
17700.	52.33	291.00	-12.00	0.5290E+03	0.7054E+03	-29.73
17800.	52.33	292.00	-12.20	0.5269E+03	0.7031E+03	-29.92
17900.	51.80	293.00	-12.40	0.5248E+03	0.7009E+03	-30.11
18000.	52.99	293.00	-12.60	0.5227E+03	0.6986E+03	-30.30
18100.	52.66	292.00	-12.75	0.5206E+03	0.6962E+03	-30.39
18200.	52.49	293.00	-12.90	0.5185E+03	0.6939E+03	-30.48
18300.	52.66	292.00	-13.05	0.5165E+03	0.6915E+03	-30.57
18400.	54.17	292.00	-13.20	0.5144E+03	0.6892E+03	-30.66
18500.	54.00	294.00	-13.35	0.5124E+03	0.6868E+03	-30.75
18600.	53.67	292.00	-13.50	0.5103E+03	0.6845E+03	-30.84
18700.	56.04	292.00	-13.65	0.5083E+03	0.6821E+03	-30.93
18800.	54.86	293.00	-13.80	0.5063E+03	0.6798E+03	-31.02
18900.	57.38	291.00	-13.95	0.5043E+03	0.6775E+03	-31.11
19000.	56.04	293.00	-14.10	0.5023E+03	0.6752E+03	-31.20
19100.	56.20	292.00	-14.31	0.5002E+03	0.6730E+03	-31.36
19200.	60.93	291.00	-14.52	0.4982E+03	0.6709E+03	-31.52
19300.	57.22	292.00	-14.73	0.4962E+03	0.6687E+03	-31.68
19400.	62.60	291.00	-14.94	0.4942E+03	0.6666E+03	-31.84
19500.	64.96	291.00	-15.15	0.4923E+03	0.6645E+03	-32.00
19600.	64.47	290.00	-15.36	0.4903E+03	0.6624E+03	-32.16
19700.	69.19	291.00	-15.57	0.4883E+03	0.6603E+03	-32.32
19800.	70.70	292.00	-15.78	0.4864E+03	0.6581E+03	-32.48
19900.	71.56	287.00	-15.99	0.4844E+03	0.6560E+03	-32.64

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
20000.	69.03	288.00	-16.20	0.4825E+03	0.6539E+03	-32.80
20100.	71.23	290.00	-16.17	0.4805E+03	0.6512E+03	-32.85
20200.	69.69	287.00	-16.14	0.4786E+03	0.6485E+03	-32.90
20300.	71.56	287.00	-16.11	0.4767E+03	0.6458E+03	-32.95
20400.	71.88	290.00	-16.08	0.4747E+03	0.6432E+03	-33.00
20500.	72.90	286.00	-16.05	0.4728E+03	0.6405E+03	-33.05
20600.	75.10	285.00	-16.02	0.4709E+03	0.6378E+03	-33.10
20700.	79.49	284.00	-15.99	0.4690E+03	0.6352E+03	-33.15
20800.	81.00	282.00	-15.96	0.4672E+03	0.6326E+03	-33.20
20900.	80.51	281.00	-15.93	0.4653E+03	0.6300E+03	-33.25
21000.	83.37	281.00	-15.90	0.4634E+03	0.6273E+03	-33.30
21100.	86.06	283.00	-16.10	0.4615E+03	0.6253E+03	-33.41
21200.	84.71	283.00	-16.30	0.4597E+03	0.6233E+03	-33.52
21300.	88.78	279.00	-16.50	0.4578E+03	0.6212E+03	-33.63
21400.	88.62	279.00	-16.70	0.4560E+03	0.6192E+03	-33.74
21500.	82.35	280.00	-16.90	0.4541E+03	0.6172E+03	-33.85
21600.	82.35	281.00	-17.10	0.4523E+03	0.6152E+03	-33.96
21700.	84.38	282.00	-17.30	0.4505E+03	0.6132E+03	-34.07
21800.	83.69	283.00	-17.50	0.4486E+03	0.6112E+03	-34.18
21900.	89.11	282.00	-17.70	0.4468E+03	0.6092E+03	-34.29
22000.	91.31	284.00	-17.90	0.4450E+03	0.6072E+03	-34.40
22100.	86.42	285.00	-18.13	0.4432E+03	0.6053E+03	-34.59
22200.	84.22	286.00	-18.36	0.4414E+03	0.6034E+03	-34.78
22300.	84.71	286.00	-18.59	0.4396E+03	0.6015E+03	-34.97
22400.	83.04	283.00	-18.82	0.4378E+03	0.5996E+03	-35.16
22500.	82.87	283.00	-19.05	0.4360E+03	0.5977E+03	-35.35
22600.	82.19	283.00	-19.28	0.4343E+03	0.5958E+03	-35.54
22700.	85.24	281.00	-19.51	0.4325E+03	0.5939E+03	-35.73
22800.	87.24	281.00	-19.74	0.4307E+03	0.5920E+03	-35.92
22900.	88.09	279.00	-19.97	0.4290E+03	0.5901E+03	-36.11
23000.	86.42	279.00	-20.20	0.4272E+03	0.5883E+03	-36.30
23100.	86.25	277.00	-20.44	0.4255E+03	0.5864E+03	-36.48
23200.	88.62	274.00	-20.68	0.4237E+03	0.5846E+03	-36.66
23300.	83.89	277.00	-20.92	0.4220E+03	0.5827E+03	-36.84
23400.	83.20	275.00	-21.16	0.4203E+03	0.5809E+03	-37.02
23500.	83.53	274.00	-21.40	0.4185E+03	0.5790E+03	-37.20
23600.	87.76	274.00	-21.64	0.4168E+03	0.5772E+03	-37.38
23700.	84.88	274.00	-21.88	0.4151E+03	0.5754E+03	-37.56
23800.	83.53	273.00	-22.12	0.4134E+03	0.5736E+03	-37.74
23900.	83.04	272.00	-22.36	0.4117E+03	0.5718E+03	-37.92
24000.	83.89	272.00	-22.60	0.4100E+03	0.5700E+03	-38.10
24100.	83.37	271.00	-22.90	0.4083E+03	0.5683E+03	-38.34
24200.	83.20	270.00	-23.20	0.4066E+03	0.5666E+03	-38.58
24300.	86.58	269.00	-23.50	0.4049E+03	0.5649E+03	-38.82
24400.	86.42	269.00	-23.80	0.4032E+03	0.5633E+03	-39.06
24500.	89.44	268.00	-24.10	0.4016E+03	0.5616E+03	-39.30
24600.	87.60	269.00	-24.40	0.3999E+03	0.5599E+03	-39.54
24700.	87.76	270.00	-24.70	0.3982E+03	0.5583E+03	-39.78
24800.	90.45	269.00	-25.00	0.3966E+03	0.5566E+03	-40.02
24900.	91.63	270.00	-25.30	0.3949E+03	0.5550E+03	-40.26

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
25000.	90.78	270.00	-25.60	0.3933E+03	0.5534E+03	-40.50
25100.	89.11	272.00	-25.82	0.3916E+03	0.5515E+03	-40.66
25200.	90.98	271.00	-26.04	0.3900E+03	0.5497E+03	-40.82
25300.	88.78	273.00	-26.26	0.3884E+03	0.5479E+03	-40.98
25400.	91.47	273.00	-26.48	0.3867E+03	0.5461E+03	-41.14
25500.	87.76	272.00	-26.70	0.3851E+03	0.5443E+03	-41.30
25600.	86.91	275.00	-26.92	0.3835E+03	0.5425E+03	-41.46
25700.	88.62	273.00	-27.14	0.3819E+03	0.5407E+03	-41.62
25800.	84.88	271.00	-27.36	0.3803E+03	0.5389E+03	-41.78
25900.	87.76	272.00	-27.58	0.3787E+03	0.5371E+03	-41.94
26000.	84.88	272.00	-27.80	0.3771E+03	0.5353E+03	-42.10
26100.	86.42	269.00	-28.08	0.3755E+03	0.5337E+03	-42.31
26200.	86.75	272.00	-28.36	0.3739E+03	0.5320E+03	-42.52
26300.	87.07	269.00	-28.64	0.3723E+03	0.5304E+03	-42.73
26400.	86.42	271.00	-28.92	0.3707E+03	0.5287E+03	-42.94
26500.	89.11	271.00	-29.20	0.3692E+03	0.5271E+03	-43.15
26600.	88.94	268.00	-29.48	0.3676E+03	0.5255E+03	-43.36
26700.	90.78	267.00	-29.76	0.3660E+03	0.5239E+03	-43.57
26800.	87.24	265.00	-30.04	0.3645E+03	0.5222E+03	-43.78
26900.	91.96	266.00	-30.32	0.3629E+03	0.5206E+03	-43.99
27000.	90.62	268.00	-30.60	0.3614E+03	0.5190E+03	-44.20
27100.	89.80	264.00	-30.81	0.3599E+03	0.5172E+03	-44.39
27200.	95.18	264.00	-31.02	0.3583E+03	0.5155E+03	-44.58
27300.	94.52	266.00	-31.23	0.3568E+03	0.5137E+03	-44.77
27400.	89.96	269.00	-31.44	0.3553E+03	0.5120E+03	-44.96
27500.	92.65	270.00	-31.65	0.3537E+03	0.5102E+03	-45.15
27600.	96.36	267.00	-31.86	0.3522E+03	0.5085E+03	-45.34
27700.	98.56	269.00	-32.07	0.3507E+03	0.5067E+03	-45.53
27800.	99.57	269.00	-32.28	0.3492E+03	0.5050E+03	-45.72
27900.	100.92	269.00	-32.49	0.3477E+03	0.5033E+03	-45.91
28000.	103.44	269.00	-32.70	0.3462E+03	0.5016E+03	-46.10
28100.	101.61	270.00	-32.87	0.3447E+03	0.4998E+03	-46.25
28200.	102.79	271.00	-33.04	0.3433E+03	0.4980E+03	-46.40
28300.	104.99	269.00	-33.21	0.3418E+03	0.4962E+03	-46.55
28400.	105.81	268.00	-33.38	0.3403E+03	0.4944E+03	-46.70
28500.	106.66	268.00	-33.55	0.3388E+03	0.4926E+03	-46.85
28600.	110.53	268.00	-33.72	0.3374E+03	0.4908E+03	-47.00
28700.	118.47	267.00	-33.89	0.3359E+03	0.4890E+03	-47.15
28800.	114.93	269.00	-34.06	0.3345E+03	0.4873E+03	-47.30
28900.	119.49	266.00	-34.23	0.3330E+03	0.4855E+03	-47.45
29000.	123.88	265.00	-34.40	0.3316E+03	0.4838E+03	-47.60
29100.	125.07	265.00	-34.48	0.3301E+03	0.4818E+03	-47.70
29200.	128.61	264.00	-34.56	0.3287E+03	0.4799E+03	-47.80
29300.	130.12	261.00	-34.64	0.3273E+03	0.4780E+03	-47.90
29400.	132.64	259.00	-34.72	0.3259E+03	0.4761E+03	-48.00
29500.	134.84	260.00	-34.80	0.3244E+03	0.4742E+03	-48.10
29600.	137.89	260.00	-34.88	0.3230E+03	0.4723E+03	-48.20
29700.	140.09	259.00	-34.96	0.3216E+03	0.4704E+03	-48.30
29800.	146.49	258.00	-35.04	0.3202E+03	0.4685E+03	-48.40
29900.	146.98	260.00	-35.12	0.3189E+03	0.4666E+03	-48.50

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
30000.	146.00	261.00	-35.20	0.3175E+03	0.4647E+03	-48.60
30100.	144.98	261.00	-35.41	0.3161E+03	0.4631E+03	-48.77
30200.	148.00	260.00	-35.62	0.3147E+03	0.4615E+03	-48.94
30300.	146.33	262.00	-35.83	0.3133E+03	0.4599E+03	-49.11
30400.	149.87	261.00	-36.04	0.3120E+03	0.4583E+03	-49.28
30500.	147.18	263.00	-36.25	0.3106E+03	0.4567E+03	-49.45
30600.	149.02	261.00	-36.46	0.3093E+03	0.4551E+03	-49.62
30700.	145.14	263.00	-36.67	0.3079E+03	0.4535E+03	-49.79
30800.	148.00	263.00	-36.88	0.3066E+03	0.4520E+03	-49.96
30900.	150.20	263.00	-37.09	0.3052E+03	0.4504E+03	-50.13
31000.	151.05	263.00	-37.30	0.3039E+03	0.4488E+03	-50.30
31100.	153.90	262.00	-37.51	0.3026E+03	0.4473E+03	-50.48
31200.	151.71	262.00	-37.72	0.3012E+03	0.4457E+03	-50.66
31300.	151.54	262.00	-37.93	0.2999E+03	0.4441E+03	-50.84
31400.	154.07	262.00	-38.14	0.2986E+03	0.4426E+03	-51.02
31500.	151.54	263.00	-38.35	0.2973E+03	0.4410E+03	-51.20
31600.	151.54	263.00	-38.56	0.2960E+03	0.4395E+03	-51.38
31700.	156.96	260.00	-38.77	0.2947E+03	0.4379E+03	-51.56
31800.	154.07	262.00	-38.98	0.2934E+03	0.4364E+03	-51.74
31900.	154.27	262.00	-39.19	0.2921E+03	0.4349E+03	-51.92
32000.	157.81	261.00	-39.40	0.2908E+03	0.4333E+03	-52.10
32100.	152.56	264.00	-39.70	0.2895E+03	0.4320E+03	-52.35
32200.	156.10	262.00	-40.00	0.2882E+03	0.4306E+03	-52.60
32300.	157.61	262.00	-40.30	0.2869E+03	0.4292E+03	-52.85
32400.	154.76	262.00	-40.60	0.2856E+03	0.4279E+03	-53.10
32500.	157.45	261.00	-40.90	0.2844E+03	0.4265E+03	-53.35
32600.	157.97	262.00	-41.20	0.2831E+03	0.4252E+03	-53.60
32700.	157.97	261.00	-41.50	0.2818E+03	0.4238E+03	-53.85
32800.	158.99	262.00	-41.80	0.2806E+03	0.4225E+03	-54.10
32900.	157.12	263.00	-42.10	0.2793E+03	0.4212E+03	-54.35
33000.	157.61	264.00	-42.40	0.2781E+03	0.4198E+03	-54.60
33100.	158.83	261.00	-42.62	0.2768E+03	0.4183E+03	-54.78
33200.	157.81	263.00	-42.84	0.2756E+03	0.4169E+03	-54.96
33300.	161.52	262.00	-43.06	0.2744E+03	0.4154E+03	-55.14
33400.	163.55	261.00	-43.28	0.2731E+03	0.4139E+03	-55.32
33500.	166.40	264.00	-43.50	0.2719E+03	0.4124E+03	-55.50
33600.	158.99	264.00	-43.72	0.2707E+03	0.4110E+03	-55.68
33700.	160.99	263.00	-43.94	0.2695E+03	0.4095E+03	-55.86
33800.	163.71	263.00	-44.16	0.2682E+03	0.4081E+03	-56.04
33900.	162.01	264.00	-44.38	0.2670E+03	0.4066E+03	-56.22
34000.	159.15	264.00	-44.60	0.2658E+03	0.4052E+03	-56.40
34100.	165.72	263.00	-44.73	0.2646E+03	0.4036E+03	-56.50
34200.	159.65	265.00	-44.86	0.2634E+03	0.4020E+03	-56.60
34300.	153.90	264.00	-44.99	0.2622E+03	0.4004E+03	-56.70
34400.	159.81	267.00	-45.12	0.2610E+03	0.3988E+03	-56.80
34500.	160.50	263.00	-45.25	0.2599E+03	0.3972E+03	-56.90
34600.	165.22	263.00	-45.38	0.2587E+03	0.3956E+03	-57.00
34700.	164.37	265.00	-45.51	0.2575E+03	0.3941E+03	-57.10
34800.	169.09	262.00	-45.64	0.2563E+03	0.3925E+03	-57.20
34900.	166.24	262.00	-45.77	0.2552E+03	0.3909E+03	-57.30

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
35000.	166.40	263.00	-45.90	0.2540E+03	0.3894E+03	-57.40
35100.	168.08	262.00	-46.12	0.2529E+03	0.3880E+03	-57.60
35200.	176.54	259.00	-46.34	0.2517E+03	0.3866E+03	-57.80
35300.	178.90	259.00	-46.56	0.2506E+03	0.3852E+03	-58.00
35400.	176.02	258.00	-46.78	0.2494E+03	0.3838E+03	-58.20
35500.	177.36	258.00	-47.00	0.2483E+03	0.3824E+03	-58.40
35600.	178.71	257.00	-47.22	0.2471E+03	0.3811E+03	-58.60
35700.	176.54	259.00	-47.44	0.2460E+03	0.3797E+03	-58.80
35800.	181.59	257.00	-47.66	0.2449E+03	0.3783E+03	-59.00
35900.	183.10	257.00	-47.88	0.2438E+03	0.3770E+03	-59.20
36000.	183.10	256.00	-48.10	0.2427E+03	0.3756E+03	-59.40
36100.	185.63	256.00	-48.31	0.2415E+03	0.3742E+03	-59.57
36200.	185.30	256.00	-48.52	0.2404E+03	0.3729E+03	-59.74
36300.	186.32	256.00	-48.73	0.2393E+03	0.3715E+03	-59.91
36400.	183.10	255.00	-48.94	0.2382E+03	0.3701E+03	-60.08
36500.	186.32	254.00	-49.15	0.2371E+03	0.3687E+03	-60.25
36600.	185.30	255.00	-49.36	0.2360E+03	0.3674E+03	-60.42
36700.	181.92	254.00	-49.57	0.2349E+03	0.3660E+03	-60.59
36800.	185.30	253.00	-49.78	0.2338E+03	0.3647E+03	-60.76
36900.	185.99	253.00	-49.99	0.2328E+03	0.3634E+03	-60.93
37000.	178.38	255.00	-50.20	0.2317E+03	0.3620E+03	-61.10
37100.	178.71	254.00	-50.49	0.2306E+03	0.3608E+03	-61.35
37200.	181.92	254.00	-50.78	0.2295E+03	0.3596E+03	-61.60
37300.	184.81	253.00	-51.07	0.2285E+03	0.3584E+03	-61.85
37400.	185.99	253.00	-51.36	0.2274E+03	0.3572E+03	-62.10
37500.	180.58	254.00	-51.65	0.2263E+03	0.3560E+03	-62.35
37600.	182.78	252.00	-51.94	0.2253E+03	0.3548E+03	-62.60
37700.	184.81	252.00	-52.23	0.2242E+03	0.3536E+03	-62.85
37800.	182.94	251.00	-52.52	0.2232E+03	0.3524E+03	-63.10
37900.	182.45	252.00	-52.81	0.2221E+03	0.3512E+03	-63.35
38000.	183.63	251.00	-53.10	0.2211E+03	0.3500E+03	-63.60
38100.	182.61	251.00	-53.37	0.2201E+03	0.3488E+03	-63.82
38200.	184.12	251.00	-53.64	0.2190E+03	0.3476E+03	-64.04
38300.	176.18	253.00	-53.91	0.2180E+03	0.3464E+03	-64.26
38400.	179.72	253.00	-54.18	0.2170E+03	0.3452E+03	-64.48
38500.	180.58	252.00	-54.45	0.2159E+03	0.3439E+03	-64.70
38600.	182.78	249.00	-54.72	0.2149E+03	0.3427E+03	-64.92
38700.	178.71	249.00	-54.99	0.2139E+03	0.3416E+03	-65.14
38800.	178.90	250.00	-55.26	0.2129E+03	0.3404E+03	-65.36
38900.	179.07	251.00	-55.53	0.2119E+03	0.3392E+03	-65.58
39000.	176.71	251.00	-55.80	0.2109E+03	0.3380E+03	-65.80
39100.	179.40	247.00	-56.15	0.2099E+03	0.3369E+03	-66.09
39200.	169.09	252.00	-56.50	0.2089E+03	0.3358E+03	-66.38
39300.	177.53	248.00	-56.85	0.2079E+03	0.3348E+03	-66.67
39400.	176.87	248.00	-57.20	0.2069E+03	0.3337E+03	-66.96
39500.	181.43	247.00	-57.55	0.2059E+03	0.3327E+03	-67.25
39600.	182.61	247.00	-57.90	0.2049E+03	0.3316E+03	-67.54
39700.	179.23	248.00	-58.25	0.2039E+03	0.3305E+03	-67.83
39800.	183.27	247.00	-58.60	0.2029E+03	0.3295E+03	-68.12
39900.	181.10	247.00	-58.95	0.2020E+03	0.3285E+03	-68.41

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
40000.	174.67	249.00	-59.30	0.2010E+03	0.3274E+03	-68.70
40100.	185.30	245.00	-59.56	0.2000E+03	0.3262E+03	-9999.00
40200.	186.81	245.00	-59.82	0.1990E+03	0.3250E+03	-9999.00
40300.	180.58	245.00	-60.08	0.1981E+03	0.3238E+03	-9999.00
40400.	186.15	243.00	-60.34	0.1971E+03	0.3227E+03	-9999.00
40500.	183.79	244.00	-60.60	0.1962E+03	0.3215E+03	-9999.00
40600.	172.31	246.00	-60.86	0.1952E+03	0.3203E+03	-9999.00
40700.	175.36	247.00	-61.12	0.1942E+03	0.3192E+03	-9999.00
40800.	181.43	244.00	-61.38	0.1933E+03	0.3180E+03	-9999.00
40900.	173.00	248.00	-61.64	0.1924E+03	0.3168E+03	-9999.00
41000.	175.85	246.00	-61.90	0.1914E+03	0.3157E+03	-9999.00
41100.	179.23	246.00	-62.09	0.1905E+03	0.3144E+03	-9999.00
41200.	178.71	246.00	-62.28	0.1896E+03	0.3132E+03	-9999.00
41300.	178.22	247.00	-62.47	0.1886E+03	0.3119E+03	-9999.00
41400.	177.72	247.00	-62.66	0.1877E+03	0.3106E+03	-9999.00
41500.	177.20	247.00	-62.85	0.1868E+03	0.3094E+03	-9999.00
41600.	177.03	245.00	-63.04	0.1859E+03	0.3082E+03	-9999.00
41700.	176.71	247.00	-63.23	0.1849E+03	0.3069E+03	-9999.00
41800.	183.79	243.00	-63.42	0.1840E+03	0.3057E+03	-9999.00
41900.	183.27	243.00	-63.61	0.1831E+03	0.3045E+03	-9999.00
42000.	181.59	244.00	-63.80	0.1822E+03	0.3032E+03	-9999.00
42100.	179.72	244.00	-63.86	0.1813E+03	0.3018E+03	-9999.00
42200.	178.71	244.00	-63.92	0.1804E+03	0.3004E+03	-9999.00
42300.	175.52	247.00	-63.98	0.1795E+03	0.2990E+03	-9999.00
42400.	173.49	249.00	-64.04	0.1787E+03	0.2976E+03	-9999.00
42500.	182.61	243.00	-64.10	0.1778E+03	0.2962E+03	-9999.00
42600.	179.92	246.00	-64.16	0.1769E+03	0.2949E+03	-9999.00
42700.	184.81	242.00	-64.22	0.1760E+03	0.2935E+03	-9999.00
42800.	179.92	244.00	-64.28	0.1751E+03	0.2921E+03	-9999.00
42900.	182.09	241.00	-64.34	0.1743E+03	0.2908E+03	-9999.00
43000.	177.20	244.00	-64.40	0.1734E+03	0.2894E+03	-9999.00
43100.	180.74	243.00	-64.57	0.1726E+03	0.2882E+03	-9999.00
43200.	181.59	242.00	-64.74	0.1717E+03	0.2870E+03	-9999.00
43300.	181.10	242.00	-64.91	0.1709E+03	0.2858E+03	-9999.00
43400.	175.36	243.00	-65.08	0.1700E+03	0.2846E+03	-9999.00
43500.	175.85	244.00	-65.25	0.1692E+03	0.2835E+03	-9999.00
43600.	175.00	247.00	-65.42	0.1683E+03	0.2823E+03	-9999.00
43700.	173.00	248.00	-65.59	0.1675E+03	0.2811E+03	-9999.00
43800.	168.93	251.00	-65.76	0.1667E+03	0.2799E+03	-9999.00
43900.	165.91	249.00	-65.93	0.1658E+03	0.2788E+03	-9999.00
44000.	168.08	248.00	-66.10	0.1650E+03	0.2776E+03	-9999.00
44100.	168.60	252.00	-66.34	0.1642E+03	0.2766E+03	-9999.00
44200.	167.91	253.00	-66.58	0.1634E+03	0.2755E+03	-9999.00
44300.	172.47	249.00	-66.82	0.1625E+03	0.2744E+03	-9999.00
44400.	174.34	251.00	-67.06	0.1617E+03	0.2734E+03	-9999.00
44500.	167.91	253.00	-67.30	0.1609E+03	0.2723E+03	-9999.00
44600.	166.73	255.00	-67.54	0.1601E+03	0.2713E+03	-9999.00
44700.	169.95	252.00	-67.78	0.1593E+03	0.2702E+03	-9999.00
44800.	170.64	252.00	-68.02	0.1585E+03	0.2692E+03	-9999.00
44900.	171.29	252.00	-68.26	0.1577E+03	0.2681E+03	-9999.00

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
45000.	172.15	252.00	-68.50	0.1569E+03	0.2671E+03	-9999.00
45100.	170.11	254.00	-68.25	0.1561E+03	0.2654E+03	-9999.00
45200.	168.77	255.00	-68.00	0.1553E+03	0.2638E+03	-9999.00
45300.	169.62	256.00	-67.75	0.1546E+03	0.2621E+03	-9999.00
45400.	170.64	254.00	-67.50	0.1538E+03	0.2605E+03	-9999.00
45500.	169.95	255.00	-67.25	0.1530E+03	0.2589E+03	-9999.00
45600.	171.29	254.00	-67.00	0.1522E+03	0.2573E+03	-9999.00
45700.	167.09	257.00	-66.75	0.1515E+03	0.2557E+03	-9999.00
45800.	169.95	253.00	-66.50	0.1507E+03	0.2541E+03	-9999.00
45900.	167.09	255.00	-66.25	0.1500E+03	0.2525E+03	-9999.00
46000.	165.39	255.00	-66.00	0.1492E+03	0.2509E+03	-9999.00
46100.	167.91	251.00	-66.02	0.1485E+03	0.2497E+03	-9999.00
46200.	163.35	254.00	-66.04	0.1477E+03	0.2485E+03	-9999.00
46300.	163.55	254.00	-66.06	0.1470E+03	0.2473E+03	-9999.00
46400.	167.09	251.00	-66.08	0.1463E+03	0.2461E+03	-9999.00
46500.	166.57	251.00	-66.10	0.1455E+03	0.2449E+03	-9999.00
46600.	162.17	253.00	-66.12	0.1448E+03	0.2437E+03	-9999.00
46700.	160.50	251.00	-66.14	0.1441E+03	0.2425E+03	-9999.00
46800.	156.79	255.00	-66.16	0.1434E+03	0.2413E+03	-9999.00
46900.	156.79	254.00	-66.18	0.1427E+03	0.2401E+03	-9999.00
47000.	153.25	258.00	-66.20	0.1420E+03	0.2390E+03	-9999.00
47100.	152.72	258.00	-66.33	0.1413E+03	0.2379E+03	-9999.00
47200.	154.92	257.00	-66.46	0.1405E+03	0.2369E+03	-9999.00
47300.	152.07	258.00	-66.59	0.1398E+03	0.2358E+03	-9999.00
47400.	146.98	261.00	-66.72	0.1391E+03	0.2348E+03	-9999.00
47500.	146.33	258.00	-66.85	0.1384E+03	0.2338E+03	-9999.00
47600.	142.95	258.00	-66.98	0.1378E+03	0.2328E+03	-9999.00
47700.	141.44	259.00	-67.11	0.1371E+03	0.2317E+03	-9999.00
47800.	142.26	255.00	-67.24	0.1364E+03	0.2307E+03	-9999.00
47900.	145.31	253.00	-67.37	0.1357E+03	0.2297E+03	-9999.00
48000.	144.13	257.00	-67.50	0.1350E+03	0.2287E+03	-9999.00
48100.	143.64	256.00	-67.71	0.1343E+03	0.2278E+03	-9999.00
48200.	143.96	258.00	-67.92	0.1337E+03	0.2269E+03	-9999.00
48300.	144.98	257.00	-68.13	0.1330E+03	0.2260E+03	-9999.00
48400.	145.31	257.00	-68.34	0.1323E+03	0.2251E+03	-9999.00
48500.	142.26	261.00	-68.55	0.1316E+03	0.2242E+03	-9999.00
48600.	139.24	263.00	-68.76	0.1310E+03	0.2233E+03	-9999.00
48700.	139.07	261.00	-68.97	0.1303E+03	0.2224E+03	-9999.00
48800.	137.73	261.00	-69.18	0.1297E+03	0.2215E+03	-9999.00
48900.	137.04	263.00	-69.39	0.1290E+03	0.2206E+03	-9999.00
49000.	139.07	260.00	-69.60	0.1284E+03	0.2197E+03	-9999.00
49100.	142.78	261.00	-69.47	0.1277E+03	0.2184E+03	-9999.00
49200.	140.58	264.00	-69.34	0.1271E+03	0.2172E+03	-9999.00
49300.	143.11	261.00	-69.21	0.1264E+03	0.2160E+03	-9999.00
49400.	142.45	265.00	-69.08	0.1258E+03	0.2147E+03	-9999.00
49500.	142.62	264.00	-68.95	0.1251E+03	0.2135E+03	-9999.00
49600.	142.26	266.00	-68.82	0.1245E+03	0.2123E+03	-9999.00
49700.	142.09	266.00	-68.69	0.1239E+03	0.2111E+03	-9999.00
49800.	142.26	267.00	-68.56	0.1233E+03	0.2099E+03	-9999.00
49900.	143.64	267.00	-68.43	0.1226E+03	0.2087E+03	-9999.00

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
50000.	142.62	266.00	-68.30	0.1220E+03	0.2075E+03	-9999.00
50100.	140.09	267.00	-68.31	0.1214E+03	0.2065E+03	-9999.00
50200.	134.84	266.00	-68.32	0.1208E+03	0.2054E+03	-9999.00
50300.	132.15	264.00	-68.33	0.1202E+03	0.2044E+03	-9999.00
50400.	128.94	269.00	-68.34	0.1196E+03	0.2034E+03	-9999.00
50500.	124.90	268.00	-68.35	0.1190E+03	0.2024E+03	-9999.00
50600.	123.36	263.00	-68.36	0.1184E+03	0.2014E+03	-9999.00
50700.	119.82	270.00	-68.37	0.1178E+03	0.2004E+03	-9999.00
50800.	120.18	265.00	-68.38	0.1172E+03	0.1994E+03	-9999.00
50900.	117.29	259.00	-68.39	0.1166E+03	0.1984E+03	-9999.00
51000.	113.25	261.00	-68.40	0.1160E+03	0.1974E+03	-9999.00
51100.	113.06	255.00	-68.45	0.1154E+03	0.1964E+03	-9999.00
51200.	106.99	256.00	-68.50	0.1148E+03	0.1955E+03	-9999.00
51300.	109.88	254.00	-68.55	0.1143E+03	0.1946E+03	-9999.00
51400.	109.02	251.00	-68.60	0.1137E+03	0.1936E+03	-9999.00
51500.	109.02	253.00	-68.65	0.1131E+03	0.1927E+03	-9999.00
51600.	110.53	250.00	-68.70	0.1125E+03	0.1918E+03	-9999.00
51700.	109.02	251.00	-68.75	0.1120E+03	0.1909E+03	-9999.00
51800.	108.33	255.00	-68.80	0.1114E+03	0.1899E+03	-9999.00
51900.	112.57	248.00	-68.85	0.1109E+03	0.1890E+03	-9999.00
52000.	110.89	256.00	-68.90	0.1103E+03	0.1881E+03	-9999.00
52100.	111.88	254.00	-69.02	0.1097E+03	0.1873E+03	-9999.00
52200.	111.71	253.00	-69.14	0.1092E+03	0.1864E+03	-9999.00
52300.	106.66	254.00	-69.26	0.1086E+03	0.1856E+03	-9999.00
52400.	107.35	254.00	-69.38	0.1081E+03	0.1848E+03	-9999.00
52500.	103.81	254.00	-69.50	0.1075E+03	0.1840E+03	-9999.00
52600.	107.15	254.00	-69.62	0.1070E+03	0.1831E+03	-9999.00
52700.	106.82	254.00	-69.74	0.1064E+03	0.1823E+03	-9999.00
52800.	105.97	253.00	-69.86	0.1059E+03	0.1815E+03	-9999.00
52900.	107.68	251.00	-69.98	0.1054E+03	0.1807E+03	-9999.00
53000.	111.88	248.00	-70.10	0.1048E+03	0.1799E+03	-9999.00
53100.	112.57	250.00	-70.24	0.1043E+03	0.1791E+03	-9999.00
53200.	110.53	250.00	-70.38	0.1038E+03	0.1783E+03	-9999.00
53300.	106.99	250.00	-70.52	0.1032E+03	0.1775E+03	-9999.00
53400.	111.88	257.00	-70.66	0.1027E+03	0.1767E+03	-9999.00
53500.	106.66	246.00	-70.80	0.1022E+03	0.1759E+03	-9999.00
53600.	108.69	256.00	-70.94	0.1017E+03	0.1752E+03	-9999.00
53700.	109.35	252.00	-71.08	0.1012E+03	0.1744E+03	-9999.00
53800.	107.84	259.00	-71.22	0.1006E+03	0.1736E+03	-9999.00
53900.	107.35	259.00	-71.36	0.1001E+03	0.1728E+03	-9999.00
54000.	108.33	262.00	-71.50	0.9961E+02	0.1721E+03	-9999.00
54100.	108.33	263.00	-71.66	0.9910E+02	0.1713E+03	-9999.00
54200.	108.33	263.00	-71.82	0.9859E+02	0.1706E+03	-9999.00
54300.	106.99	265.00	-71.98	0.9808E+02	0.1699E+03	-9999.00
54400.	106.50	264.00	-72.14	0.9758E+02	0.1691E+03	-9999.00
54500.	106.50	260.00	-72.30	0.9708E+02	0.1684E+03	-9999.00
54600.	106.82	263.00	-72.46	0.9658E+02	0.1676E+03	-9999.00
54700.	106.50	261.00	-72.62	0.9608E+02	0.1669E+03	-9999.00
54800.	105.15	266.00	-72.78	0.9559E+02	0.1662E+03	-9999.00
54900.	107.15	258.00	-72.94	0.9510E+02	0.1655E+03	-9999.00

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
55000.	104.99	259.00	-73.10	0.9461E+02	0.1648E+03	-9999.00
56000.	91.88	258.00	-72.90	0.8985E+02	0.1563E+03	-9999.00
57000.	82.42	255.00	-73.50	0.8533E+02	0.1489E+03	-9999.00
58000.	72.29	260.00	-72.20	0.8104E+02	0.1405E+03	-9999.00
59000.	61.31	269.00	-67.80	0.7702E+02	0.1307E+03	-9999.00
60000.	47.63	284.00	-66.40	0.7326E+02	0.1234E+03	-9999.00
61000.	29.73	309.00	-66.70	0.6969E+02	0.1176E+03	-9999.00
62000.	13.34	318.00	-67.30	0.6628E+02	0.1123E+03	-9999.00
63000.	15.71	255.00	-67.40	0.6304E+02	0.1067E+03	-9999.00
64000.	25.33	256.00	-67.40	0.5995E+02	0.1015E+03	-9999.00
65000.	23.31	264.00	-66.90	0.5702E+02	0.9631E+02	-9999.00
66000.	14.86	283.00	-65.30	0.5424E+02	0.9091E+02	-9999.00
67000.	8.44	307.00	-63.80	0.5163E+02	0.8591E+02	-9999.00
68000.	5.07	342.00	-61.70	0.4916E+02	0.8099E+02	-9999.00
69000.	4.90	27.00	-61.50	0.4682E+02	0.7706E+02	-9999.00
70000.	4.39	44.00	-61.50	0.4459E+02	0.7339E+02	-9999.00
71000.	3.55	348.00	-60.60	0.4247E+02	0.6961E+02	-9999.00
72000.	7.43	317.00	-59.30	0.4046E+02	0.6591E+02	-9999.00
73000.	10.30	304.00	-58.80	0.3856E+02	0.6267E+02	-9999.00
74000.	11.65	285.00	-59.00	0.3675E+02	0.5978E+02	-9999.00
75000.	17.40	289.00	-57.60	0.3502E+02	0.5660E+02	-9999.00
76000.	17.23	298.00	-58.20	0.3339E+02	0.5411E+02	-9999.00
77000.	9.29	271.00	-57.30	0.3182E+02	0.5136E+02	-9999.00
78000.	10.30	227.00	-55.40	0.3034E+02	0.4854E+02	-9999.00
79000.	15.03	213.00	-55.40	0.2894E+02	0.4630E+02	-9999.00
80000.	19.59	214.00	-55.00	0.2760E+02	0.4407E+02	-9999.00
81000.	22.63	230.00	-54.00	0.2633E+02	0.4186E+02	-9999.00
82000.	23.65	254.00	-53.40	0.2512E+02	0.3982E+02	-9999.00
83000.	25.50	263.00	-53.00	0.2397E+02	0.3793E+02	-9999.00
84000.	31.92	262.00	-52.60	0.2288E+02	0.3614E+02	-9999.00
85000.	40.20	265.00	-51.40	0.2184E+02	0.3431E+02	-9999.00
86000.	45.43	269.00	-50.50	0.2085E+02	0.3262E+02	-9999.00
87000.	47.97	269.00	-49.10	0.1991E+02	0.3096E+02	-9999.00
88000.	52.53	264.00	-48.80	0.1901E+02	0.2952E+02	-9999.00
89000.	60.13	259.00	-49.00	0.1816E+02	0.2822E+02	-9999.00
90000.	71.27	256.00	-48.40	0.1734E+02	0.2688E+02	-9999.00
91000.	80.90	259.00	-47.50	0.1657E+02	0.2558E+02	-9999.00
92000.	85.29	264.00	-47.60	0.1583E+02	0.2445E+02	-9999.00
93000.	86.98	266.00	-48.40	0.1512E+02	0.2344E+02	-9999.00
94000.	86.14	266.00	-49.40	0.1444E+02	0.2248E+02	-9999.00
95000.	83.27	265.00	-49.90	0.1379E+02	0.2152E+02	-9999.00
96000.	79.04	264.00	-48.10	0.1317E+02	0.2039E+02	-9999.00
97000.	77.69	263.00	-46.44	0.1252E+02	0.1924E+02	-9999.00
98000.	77.69	267.00	-45.37	0.1197E+02	0.1830E+02	-9999.00
99000.	77.69	271.00	-45.28	0.1144E+02	0.1749E+02	-9999.00
100000.	77.69	274.00	-45.25	0.1093E+02	0.1671E+02	-9999.00
101000.	82.76	274.00	-45.07	0.1045E+02	0.1596E+02	-9999.00
102000.	87.83	273.00	-44.20	0.9991E+01	0.1520E+02	-9999.00
103000.	91.20	271.00	-42.83	0.9553E+01	0.1445E+02	-9999.00
104000.	97.96	269.00	-41.45	0.9137E+01	0.1374E+02	-9999.00

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
105000.	103.03	271.00	-40.11	0.8741E+01	0.1307E+02	-9999.00
106000.	106.40	274.00	-39.23	0.8365E+01	0.1246E+02	-9999.00
107000.	108.09	276.00	-39.57	0.8005E+01	0.1194E+02	-9999.00
108000.	106.40	277.00	-40.70	0.7659E+01	0.1148E+02	-9999.00
109000.	103.03	276.00	-41.12	0.7327E+01	0.1100E+02	-9999.00
110000.	103.03	274.00	-40.31	0.7010E+01	0.1049E+02	-9999.00
111000.	108.09	269.00	-39.54	0.6708E+01	0.1000E+02	-9999.00
112000.	116.54	268.00	-38.79	0.6419E+01	0.9542E+01	-9999.00
113000.	118.23	268.00	-38.17	0.6144E+01	0.9103E+01	-9999.00
114000.	119.92	269.00	-38.51	0.5881E+01	0.8731E+01	-9999.00
115000.	119.92	273.00	-39.62	0.5628E+01	0.8396E+01	-9999.00
116000.	119.92	277.00	-39.77	0.5386E+01	0.8040E+01	-9999.00
117000.	121.60	278.00	-38.93	0.5154E+01	0.7666E+01	-9999.00
118000.	123.29	277.00	-37.02	0.4934E+01	0.7279E+01	-9999.00
119000.	124.98	276.00	-34.33	0.4725E+01	0.6892E+01	-9999.00
120000.	133.43	273.00	-31.55	0.4527E+01	0.6528E+01	-9999.00
121000.	138.49	272.00	-28.85	0.4340E+01	0.6189E+01	-9999.00
122000.	141.87	270.00	-26.56	0.4162E+01	0.5880E+01	-9999.00
123000.	148.63	272.00	-25.15	0.3993E+01	0.5609E+01	-9999.00
124000.	150.32	275.00	-24.36	0.3831E+01	0.5364E+01	-9999.00
125000.	148.63	276.00	-23.64	0.3676E+01	0.5132E+01	-9999.00
126000.	143.56	274.00	-22.87	0.3528E+01	0.4911E+01	-9999.00
127000.	136.80	269.00	-22.62	0.3387E+01	0.4710E+01	-9999.00
128000.	138.49	261.00	-23.07	0.3250E+01	0.4527E+01	-9999.00
129000.	146.94	256.00	-23.60	0.3120E+01	0.4355E+01	-9999.00
130000.	155.38	258.00	-24.08	0.2994E+01	0.4188E+01	-9999.00
131000.	162.14	262.00	-24.56	0.2873E+01	0.4026E+01	-9999.00
132000.	163.83	265.00	-24.84	0.2757E+01	0.3868E+01	-9999.00
133000.	162.14	266.00	-24.55	0.2645E+01	0.3706E+01	-9999.00
134000.	157.07	263.00	-23.93	0.2538E+01	0.3548E+01	-9999.00
135000.	155.38	259.00	-23.26	0.2436E+01	0.3396E+01	-9999.00
136000.	160.45	255.00	-22.66	0.2338E+01	0.3252E+01	-9999.00
137000.	167.21	253.00	-21.95	0.2245E+01	0.3113E+01	-9999.00
138000.	175.65	251.00	-20.39	0.2155E+01	0.2970E+01	-9999.00
139000.	185.78	250.00	-17.45	0.2070E+01	0.2820E+01	-9999.00
140000.	195.92	250.00	-14.66	0.1989E+01	0.2681E+01	-9999.00
141000.	207.74	249.00	-12.42	0.1912E+01	0.2555E+01	-9999.00
142000.	206.05	256.00	-10.63	0.1838E+01	0.2439E+01	-9999.00
143000.	209.43	263.00	-8.82	0.1768E+01	0.2330E+01	-9999.00
144000.	224.63	258.00	-6.97	0.1701E+01	0.2226E+01	-9999.00
145000.	228.01	260.00	-5.67	0.1637E+01	0.2132E+01	-9999.00
146000.	222.94	262.00	-5.15	0.1575E+01	0.2047E+01	-9999.00
147000.	231.39	259.00	-4.57	0.1517E+01	0.1968E+01	-9999.00
148000.	241.52	258.00	-4.17	0.1460E+01	0.1891E+01	-9999.00
149000.	241.52	260.00	-3.59	0.1405E+01	0.1816E+01	-9999.00
150000.	239.83	259.00	-3.13	0.1353E+01	0.1746E+01	-9999.00
151000.	236.45	261.00	-2.71	0.1303E+01	0.1678E+01	-9999.00
152000.	221.25	262.00	-3.82	0.1254E+01	0.1622E+01	-9999.00
153000.	209.43	259.00	-4.56	0.1207E+01	0.1566E+01	-9999.00
154000.	219.56	258.00	-4.52	0.1162E+01	0.1507E+01	-9999.00

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
155000.	244.90	255.00	-4.54	0.119E+01	0.1451E+01	-9999.00
156000.	256.72	252.00	-3.55	0.1077E+01	0.1392E+01	-9999.00
157000.	263.48	252.00	-2.14	0.1037E+01	0.1333E+01	-9999.00
158000.	263.48	251.00	-0.85	0.9980E+00	0.1277E+01	-9999.00
159000.	261.79	251.00	0.60	0.9620E+00	0.1224E+01	-9999.00
160000.	256.72	253.00	0.71	0.9270E+00	0.1179E+01	-9999.00
161000.	248.28	253.00	-0.28	0.8920E+00	0.1139E+01	-9999.00
162000.	244.90	251.00	2.11	0.8600E+00	0.1088E+01	-9999.00
163000.	239.83	250.00	2.42	0.8280E+00	0.1047E+01	-9999.00
164000.	239.83	252.00	2.60	0.7980E+00	0.1008E+01	-9999.00
165000.	236.45	255.00	4.65	0.7690E+00	0.9643E+00	-9999.00
166000.	239.83	257.00	6.64	0.7420E+00	0.9239E+00	-9999.00
167000.	246.59	255.00	5.76	0.7150E+00	0.8931E+00	-9999.00
168000.	241.52	250.00	3.76	0.6890E+00	0.8668E+00	-9999.00
169000.	241.52	247.00	1.86	0.6640E+00	0.8411E+00	-9999.00
170000.	238.14	244.00	-0.14	0.6400E+00	0.8167E+00	-9999.00
171000.	241.52	241.00	-1.93	0.6160E+00	0.7912E+00	-9999.00
172000.	239.83	238.00	-3.85	0.5930E+00	0.7671E+00	-9999.00
173000.	243.21	235.00	-5.62	0.5710E+00	0.7435E+00	-9999.00
174000.	253.34	232.00	-7.81	0.5500E+00	0.7221E+00	-9999.00
175000.	260.10	231.00	-8.32	0.5290E+00	0.6959E+00	-9999.00
176000.	258.41	232.00	-7.35	0.5090E+00	0.6671E+00	-9999.00
177000.	246.59	237.00	-6.82	0.4900E+00	0.6409E+00	-9999.00
178000.	233.08	242.00	-8.54	0.4710E+00	0.6201E+00	-9999.00
179000.	226.32	246.00	-10.10	0.4530E+00	0.5999E+00	-9999.00
180000.	222.94	247.00	-12.01	0.4360E+00	0.5816E+00	-9999.00
181000.	224.63	249.00	-14.02	0.4190E+00	0.5633E+00	-9999.00
182000.	229.70	253.00	-15.94	0.4030E+00	0.5458E+00	-9999.00
183000.	238.14	258.00	-17.04	0.3870E+00	0.5264E+00	-9999.00
184000.	241.52	262.00	-17.14	0.3720E+00	0.5062E+00	-9999.00
185000.	246.59	263.00	-17.61	0.3580E+00	0.4880E+00	-9999.00
186000.	243.21	264.00	-18.49	0.3430E+00	0.4692E+00	-9999.00
187000.	239.83	262.00	-19.41	0.3300E+00	0.4531E+00	-9999.00
188000.	236.45	259.00	-20.28	0.3170E+00	0.4367E+00	-9999.00
189000.	234.76	257.00	-21.24	0.3040E+00	0.4204E+00	-9999.00
190000.	238.14	255.00	-22.10	0.2920E+00	0.4052E+00	-9999.00
191000.	238.14	254.00	-22.10	0.2810E+00	0.3899E+00	-9999.00
192000.	236.45	254.00	-22.39	0.2690E+00	0.3737E+00	-9999.00
193000.	234.76	254.00	-22.67	0.2590E+00	0.3602E+00	-9999.00
194000.	226.32	253.00	-23.24	0.2480E+00	0.3457E+00	-9999.00
195000.	224.63	256.00	-23.68	0.2380E+00	0.3324E+00	-9999.00
196000.	224.63	258.00	-21.96	0.2290E+00	0.3176E+00	-9999.00
197000.	219.56	258.00	-22.43	0.2200E+00	0.3057E+00	-9999.00
198000.	206.05	258.00	-22.94	0.2110E+00	0.2938E+00	-9999.00
199000.	190.85	257.00	-20.75	0.2030E+00	0.2802E+00	-9999.00
200000.	177.34	256.00	-19.85	0.1950E+00	0.2682E+00	-9999.00
201000.	168.89	255.00	-20.95	0.1870E+00	0.2583E+00	-9999.00
202000.	168.89	256.00	-21.55	0.1790E+00	0.2478E+00	-9999.00
203000.	175.65	257.00	-21.11	0.1720E+00	0.2377E+00	-9999.00
204000.	184.10	255.00	-20.13	0.1650E+00	0.2272E+00	-9999.00

TABLE 5. (Continued)

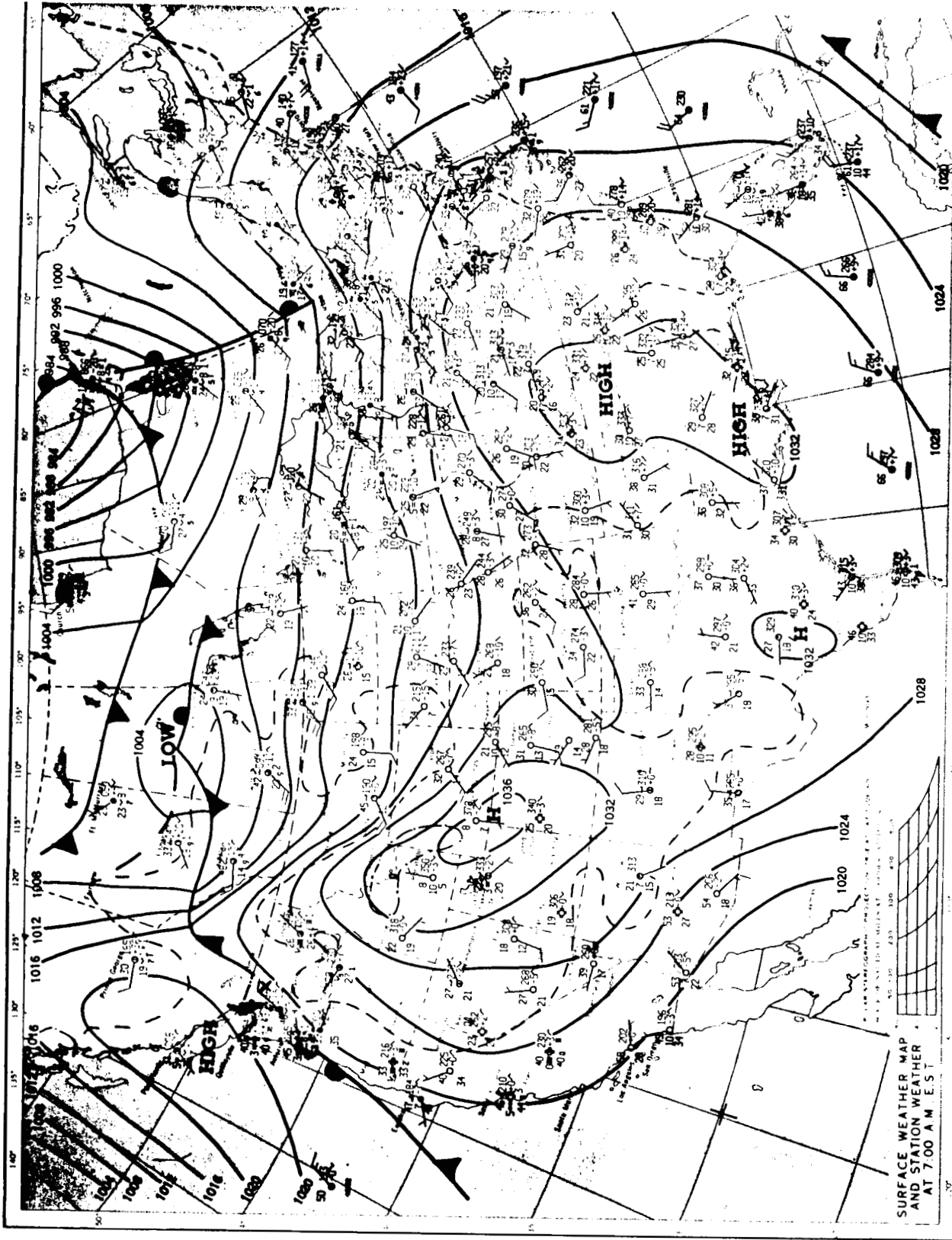
ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
205000.	197.61	251.00	-18.35	0.1590E+00	0.2174E+00	-9999.00
206000.	206.05	247.00	-16.24	0.1530E+00	0.2075E+00	-9999.00
207000.	211.12	243.00	-14.41	0.1470E+00	0.1979E+00	-9999.00
208000.	219.56	238.00	-12.89	0.1410E+00	0.1887E+00	-9999.00
209000.	224.63	235.00	-12.73	0.1360E+00	0.1819E+00	-9999.00
210000.	229.70	234.00	-13.91	0.1310E+00	0.1760E+00	-9999.00
211000.	236.45	232.00	-15.75	0.1260E+00	0.1705E+00	-9999.00
212000.	241.52	228.00	-16.99	0.1210E+00	0.1646E+00	-9999.00
213000.	233.08	225.00	-18.71	0.1160E+00	0.1588E+00	-9999.00
214000.	231.39	223.00	-20.14	0.1110E+00	0.1528E+00	-9999.00
215000.	228.01	222.00	-21.52	0.1070E+00	0.1481E+00	-9999.00
216000.	219.56	222.00	-23.39	0.1030E+00	0.1437E+00	-9999.00
217000.	190.85	227.00	-24.68	0.9900E-01	0.1388E+00	-9999.00
218000.	190.85	229.00	-26.13	0.9500E-01	0.1340E+00	-9999.00
219000.	229.70	224.00	-27.91	0.9100E-01	0.1293E+00	-9999.00
220000.	216.19	232.00	-29.53	0.8700E-01	0.1244E+00	-9999.00
221000.	221.25	236.00	-30.97	0.8400E-01	0.1208E+00	-9999.00
222000.	221.25	239.00	-44.13	0.7400E-01	0.1126E+00	-9999.00
223000.	221.25	239.00	-47.00	0.7000E-01	0.1078E+00	-9999.00
224000.	219.56	240.00	-49.90	0.6700E-01	0.1045E+00	-9999.00
225000.	217.87	241.00	-52.95	0.6400E-01	0.1013E+00	-9999.00
226000.	216.19	242.00	-55.15	0.6100E-01	0.9748E-01	-9999.00
227000.	212.81	244.00	-56.15	0.5800E-01	0.9311E-01	-9999.00
228000.	207.74	246.00	-58.09	0.5600E-01	0.9071E-01	-9999.00
229000.	202.67	248.00	-58.15	0.5300E-01	0.8588E-01	-9999.00
230000.	197.61	251.00	-60.15	0.5100E-01	0.8341E-01	-9999.00
231000.	192.54	254.00	-60.15	0.4800E-01	0.7851E-01	-9999.00
232000.	185.78	258.00	-60.15	0.4600E-01	0.7523E-01	-9999.00
233000.	180.72	262.00	-61.15	0.4400E-01	0.7230E-01	-9999.00
234000.	175.65	267.00	-61.77	0.4200E-01	0.6922E-01	-9999.00
235000.	168.89	271.00	-62.15	0.4000E-01	0.6604E-01	-9999.00
236000.	162.14	276.00	-62.15	0.3800E-01	0.6274E-01	-9999.00
237000.	155.38	281.00	-62.15	0.3600E-01	0.5944E-01	-9999.00
238000.	150.32	285.00	-62.15	0.3500E-01	0.5779E-01	-9999.00
239000.	143.56	290.00	-62.15	0.3300E-01	0.5448E-01	-9999.00
240000.	136.80	295.00	-62.15	0.3100E-01	0.5118E-01	-9999.00
241000.	130.05	299.00	-62.15	0.3000E-01	0.4953E-01	-9999.00
242000.	123.29	304.00	-62.96	0.2900E-01	0.4806E-01	-9999.00
243000.	114.85	308.00	-64.48	0.2700E-01	0.4508E-01	-9999.00
244000.	108.09	312.00	-65.15	0.2600E-01	0.4355E-01	-9999.00
245000.	99.65	316.00	-67.53	0.2500E-01	0.4236E-01	-9999.00
246000.	92.89	321.00	-70.00	0.2300E-01	0.3944E-01	-9999.00
247000.	84.45	325.00	-71.15	0.2200E-01	0.3657E-01	-9999.00
248000.	77.69	329.00	-73.10	0.2100E-01	0.3794E-01	-9999.00
249000.	69.25	333.00	-74.15	0.2000E-01	0.3501E-01	-9999.00
250000.	62.49	338.00	-74.15	0.1900E-01	0.3326E-01	-9999.00
251000.	54.05	342.00	-75.67	0.1800E-01	0.3175E-01	-9999.00
252000.	47.29	348.00	-77.20	0.1700E-01	0.3022E-01	-9999.00
253000.	40.53	354.00	-78.15	0.1600E-01	0.2858E-01	-9999.00
256000.	32.20	334.64	-77.37	0.1376E-01	0.2449E-01	-9999.00

TABLE 5. (Concluded)

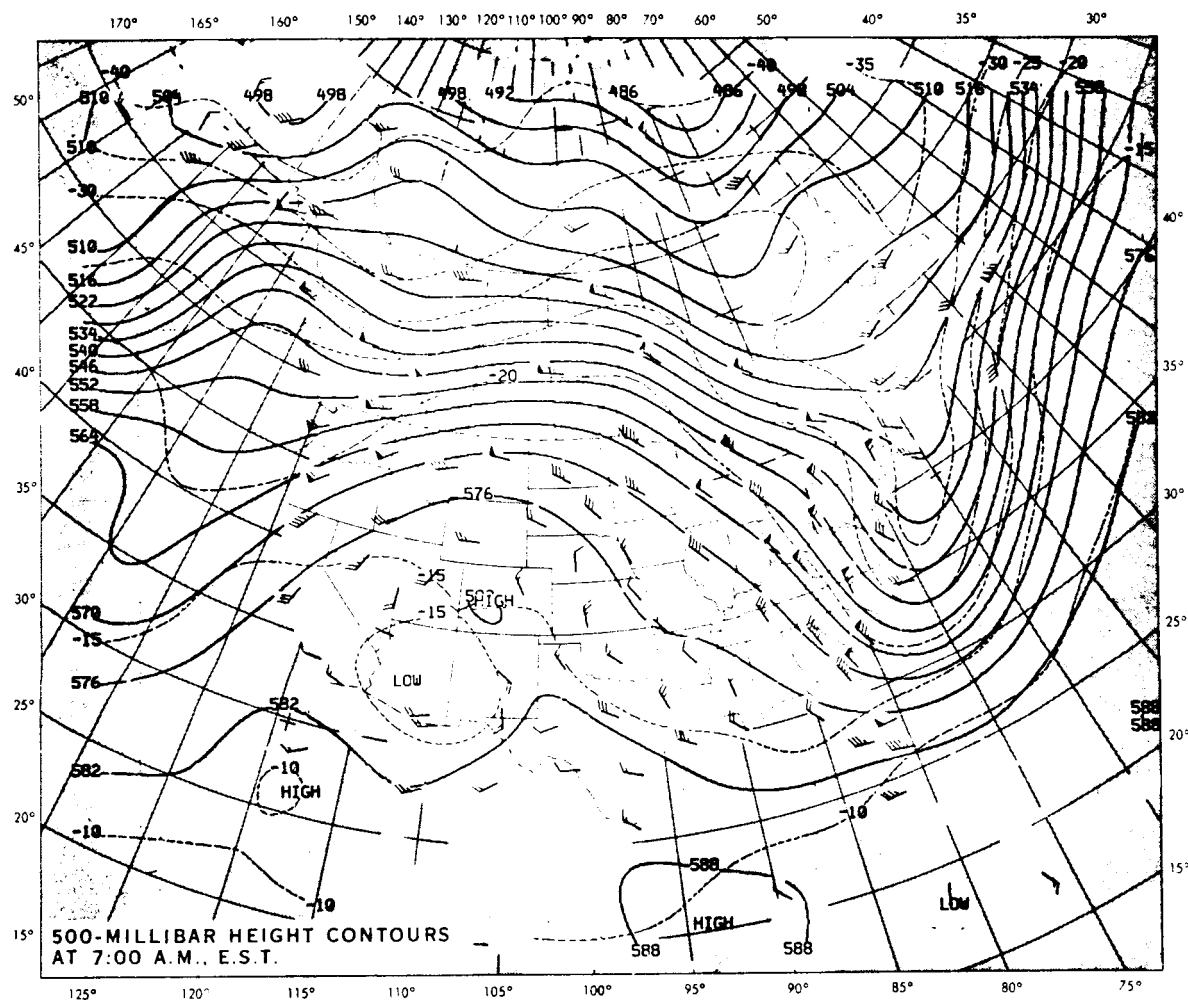
ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
259000.	29.41	307.46	-76.59	0.1184E-01	0.2098E-01	-9999.00
262000.	33.56	281.47	-75.82	0.1018E-01	0.1797E-01	-9999.00
265000.	42.69	263.90	-75.04	0.8755E-02	0.1540E-01	-9999.00
268000.	54.33	253.15	-74.26	0.7530E-02	0.1319E-01	-9999.00
271000.	50.70	249.03	-74.45	0.6460E-02	0.1133E-01	-9999.00
274000.	47.40	244.32	-74.65	0.5550E-02	0.9740E-02	-9999.00
277000.	44.43	238.93	-74.92	0.4770E-02	0.8383E-02	-9999.00
280000.	27.10	249.15	-75.75	0.4100E-02	0.7236E-02	-9999.00
283000.	13.07	286.02	-76.57	0.3530E-02	0.6256E-02	-9999.00
286000.	16.90	0.56	-77.39	0.3040E-02	0.5410E-02	-9999.00
289000.	32.81	23.21	-78.21	0.2610E-02	0.4664E-02	-9999.00
292000.	50.42	30.59	-79.03	0.2250E-02	0.4038E-02	-9999.00
295000.	51.22	30.36	-79.41	0.1930E-02	0.3470E-02	-9999.00
298000.	31.58	23.32	-79.24	0.1650E-02	0.2964E-02	-9999.00
301000.	14.20	16.09	-79.06	0.1410E-02	0.2531E-02	-9999.00
304000.	3.63	112.86	-78.88	0.1200E-02	0.2152E-02	-9999.00
307000.	21.58	135.99	-78.71	0.1030E-02	0.1845E-02	-9999.00
310000.	52.61	121.80	-78.53	0.8760E-03	0.1568E-02	-9999.00
313000.	63.02	118.31	-77.24	0.7520E-03	0.1337E-02	-9999.00
316000.	70.02	115.77	-75.81	0.6450E-03	0.1139E-02	-9999.00
319000.	77.73	112.93	-74.38	0.5530E-03	0.9692E-03	-9999.00
322000.	86.19	109.71	-72.95	0.4750E-03	0.8265E-03	-9999.00
325000.	95.54	106.09	-71.53	0.4070E-03	0.7032E-03	-9999.00
328000.	105.03	103.11	-69.28	0.3500E-03	0.5981E-03	-9999.00
331000.	112.84	102.56	-65.41	0.3030E-03	0.5081E-03	-9999.00
334000.	120.01	101.91	-61.53	0.2610E-03	0.4297E-03	-9999.00
337000.	126.07	101.07	-57.66	0.2260E-03	0.3654E-03	-9999.00
340000.	130.43	100.01	-53.78	0.1950E-03	0.3097E-03	-9999.00
343000.	132.22	98.58	-49.91	0.1680E-03	0.2622E-03	-9999.00
346000.	133.68	97.59	-44.22	0.1470E-03	0.2237E-03	-9999.00
349000.	133.38	98.07	-38.02	0.1300E-03	0.1926E-03	-9999.00
352000.	129.17	98.77	-31.81	0.1140E-03	0.1646E-03	-9999.00
355000.	119.77	99.83	-25.60	0.1000E-03	0.1407E-03	-9999.00
358000.	103.54	101.64	-19.40	0.8820E-04	0.1211E-03	-9999.00
361000.	83.70	99.41	-12.71	0.7800E-04	0.1043E-03	-9999.00
364000.	83.95	101.31	-4.33	0.7030E-04	0.9110E-04	-9999.00
367000.	82.60	103.88	4.05	0.6340E-04	0.7968E-04	-9999.00
370000.	79.30	107.43	12.43	0.5710E-04	0.6965E-04	-9999.00
373000.	73.78	112.68	20.81	0.5140E-04	0.6091E-04	-9999.00
376000.	66.07	120.96	29.19	0.4620E-04	0.5323E-04	-9999.00
379000.	53.59	111.48	38.55	0.4200E-04	0.4694E-04	-9999.00
382000.	51.85	114.85	48.69	0.3850E-04	0.4167E-04	-9999.00
385000.	50.33	118.59	59.18	0.3540E-04	0.3711E-04	-9999.00
388000.	49.15	122.68	69.97	0.3260E-04	0.3310E-04	-9999.00
391000.	48.29	127.10	81.05	0.3020E-04	0.2970E-04	-9999.00
394000.	47.75	131.80	92.38	0.2800E-04	0.2669E-04	-9999.00
397000.	47.63	136.73	103.93	0.2600E-04	0.2402E-04	-9999.00
400000.	47.94	141.78	115.67	0.2430E-04	0.2177E-04	-9999.00

FRIDAY, DECEMBER 2, 1988

ORIGINAL PAGE IS
OF POOR QUALITY



ORIGINAL PAGE IS
OF POOR QUALITY



500 Millibar Height
Contours at 1200 UT
December 2, 1988.

Continuous Lines Indicate Height Contours in Feet Above Sea Level.
Dashed Lines are Isotherms in Degrees Centigrade. Arrows Show Wind
Direction and Speed at the 500 MB Level.

Figure 2. 500 mb map 2 hr 31 min before launch of STS-27.

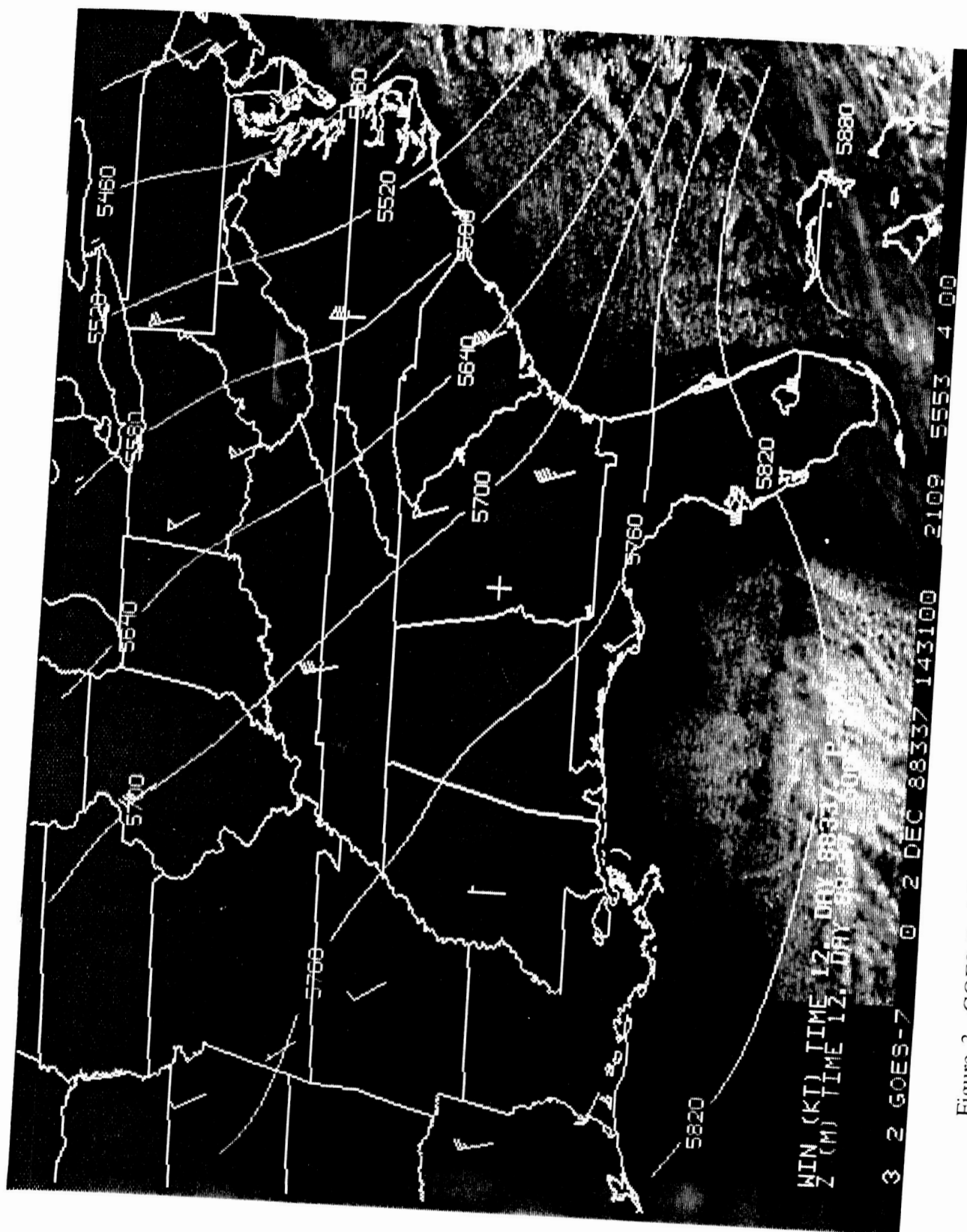


Figure 3. GOES-7 visible imagery of cloud cover at the launch of STS-27 (1431 UT, December 2, 1988). 500-mb heights (meters) and wind barbs are also included for 1200 UT.

ORIGINAL PAGE
BLACK AND WHITE PHOTOGRAPH

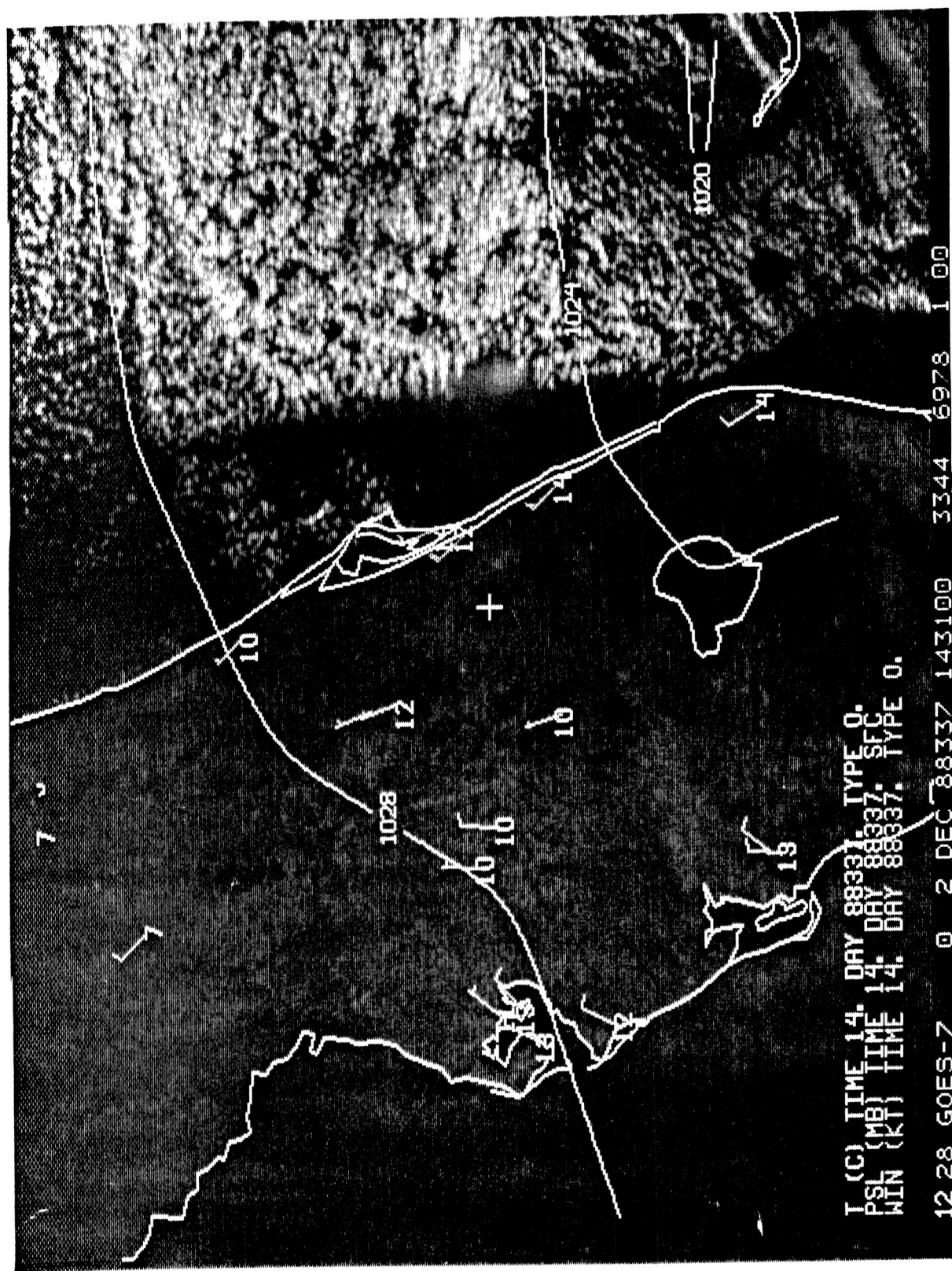


Figure 4.

Enlarged view of GOES-7 visible imagery of cloud cover taken at the launch of STS-27 (1431 UT, December 2, 1988). Surface temperatures, isobaric parameters, and wind barbs for 1400 UT are also included.

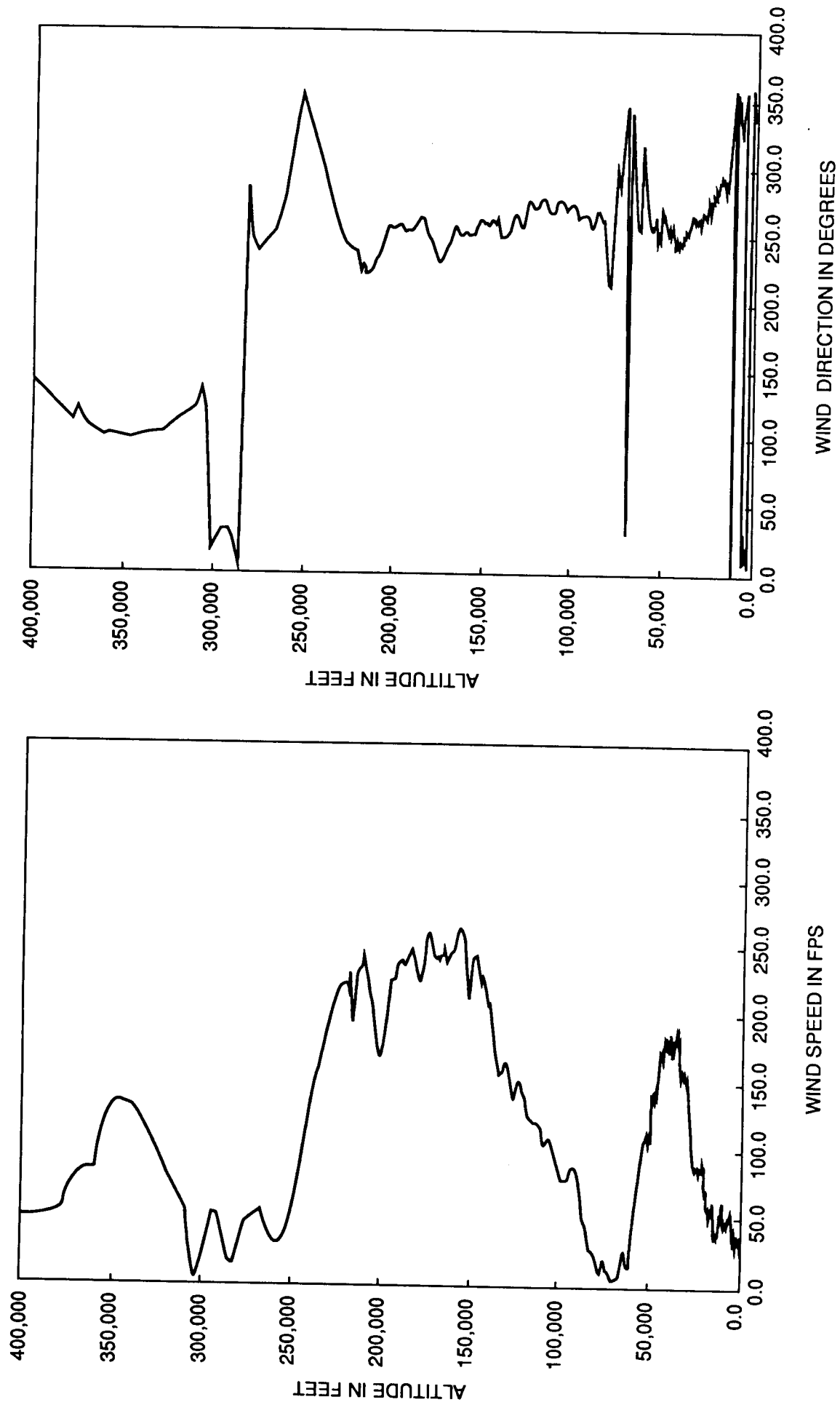


Figure 5. Scalar wind speed and direction at launch time of STS-27.

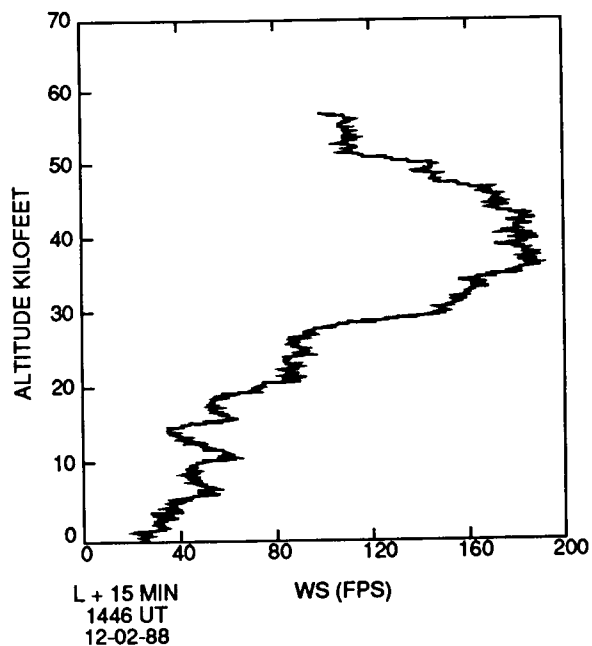
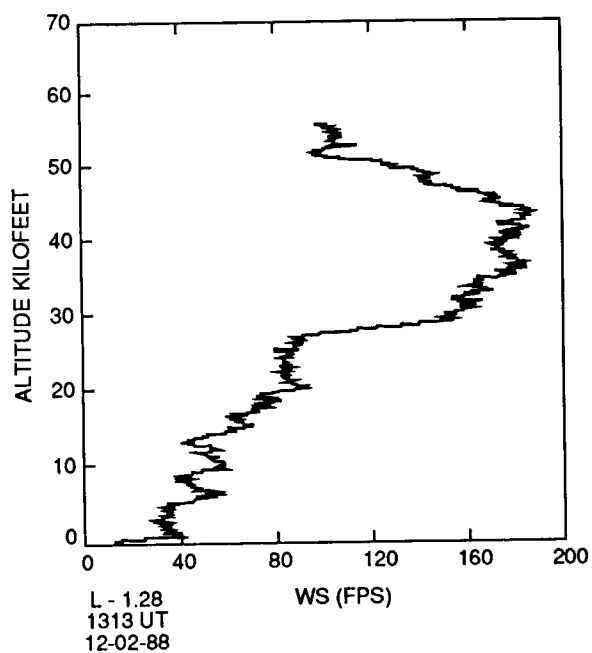
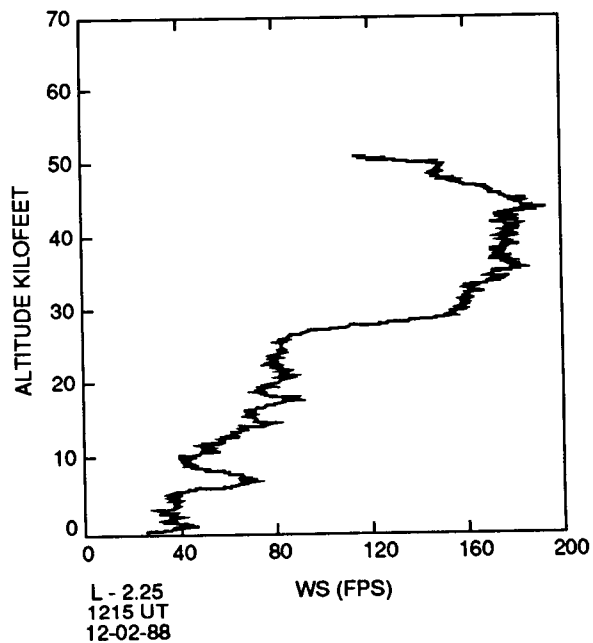
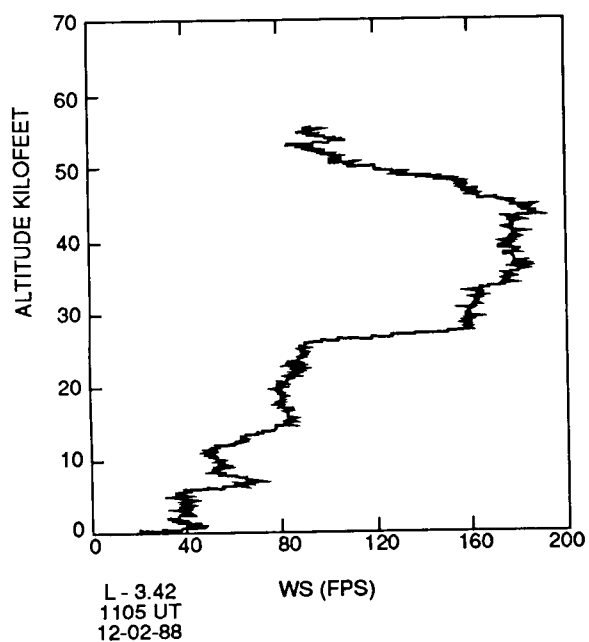


Figure 6. STS-27 prelaunch/launch Jimsphere-measured wind speeds (FPS).

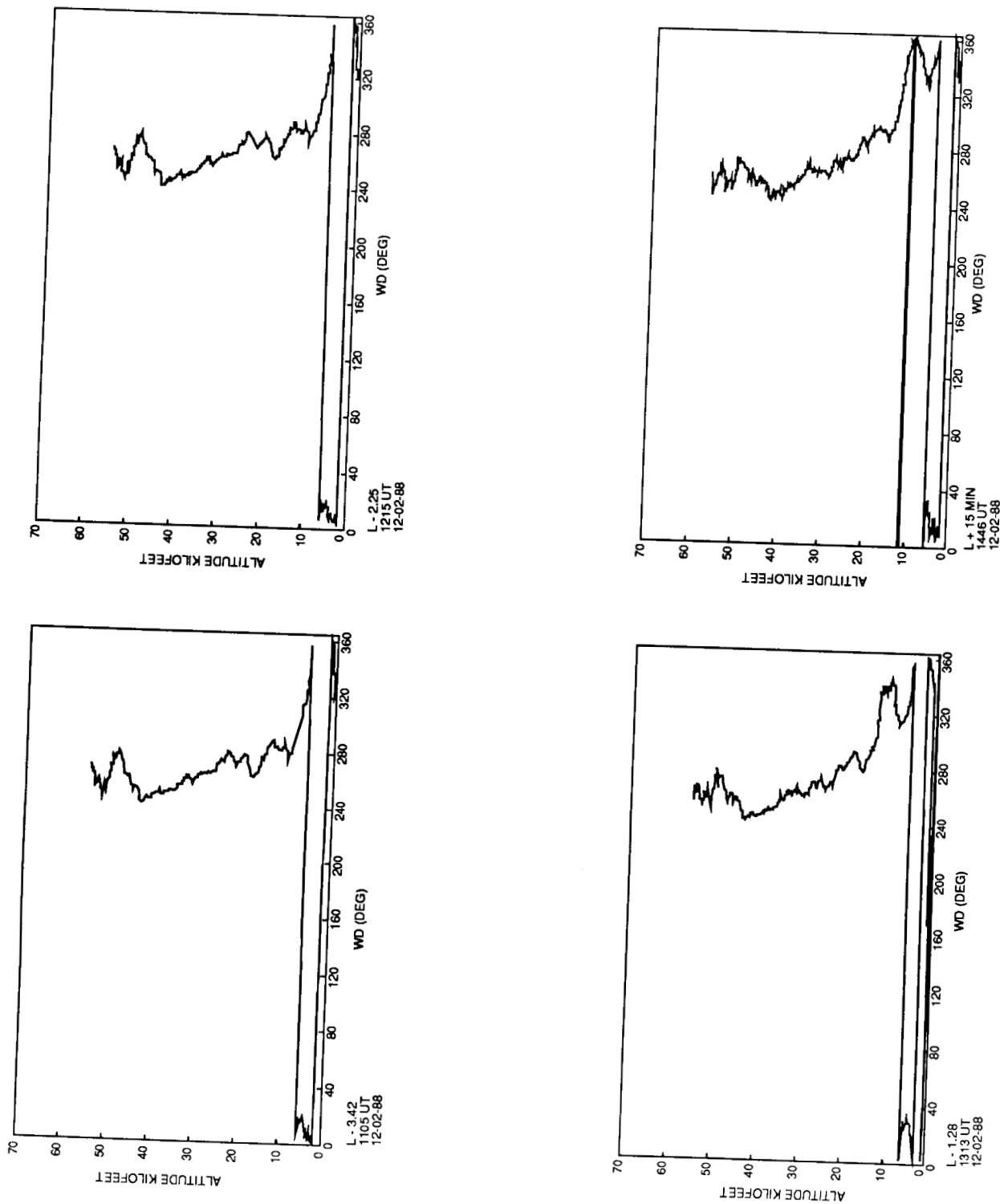
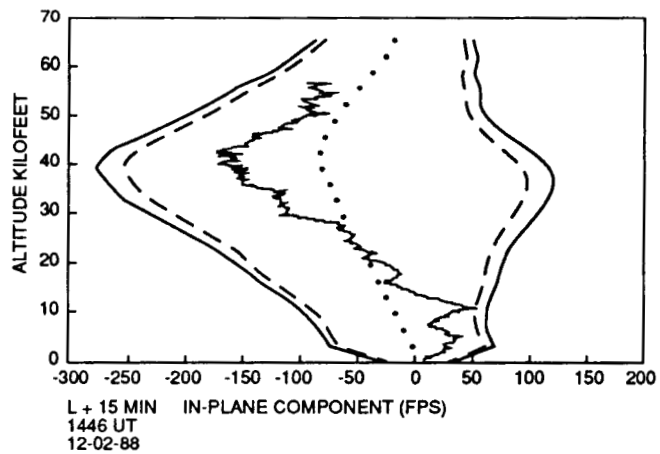
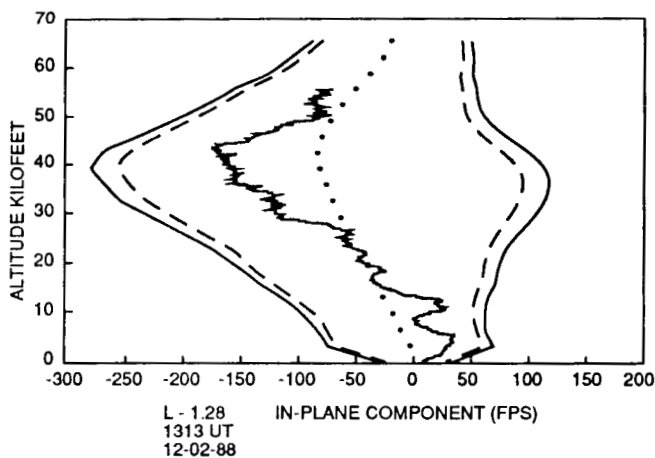
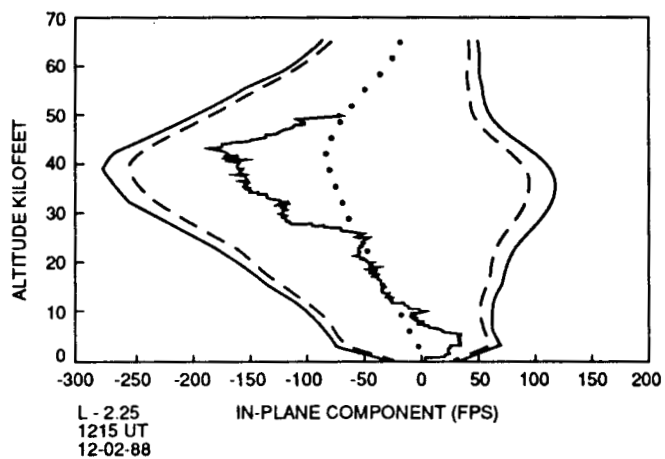
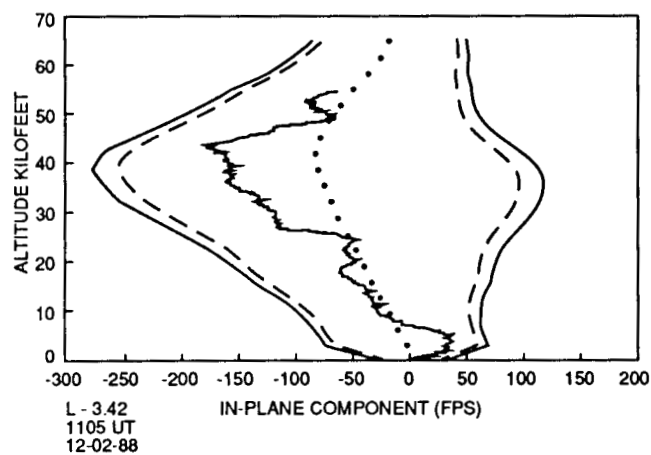


Figure 7. STS-27 prelaunch/launch Jimsphere-measured wind directions (degrees).



--- DEC 90% PROFILE ENV
 ——— DEC 85% PROFILE ENV
 DEC MEAN WINDS

Figure 8. STS-27 prelaunch/launch Jimsphere-measured in-plane component winds (FPS).
Reference flight azimuth = 39 deg.

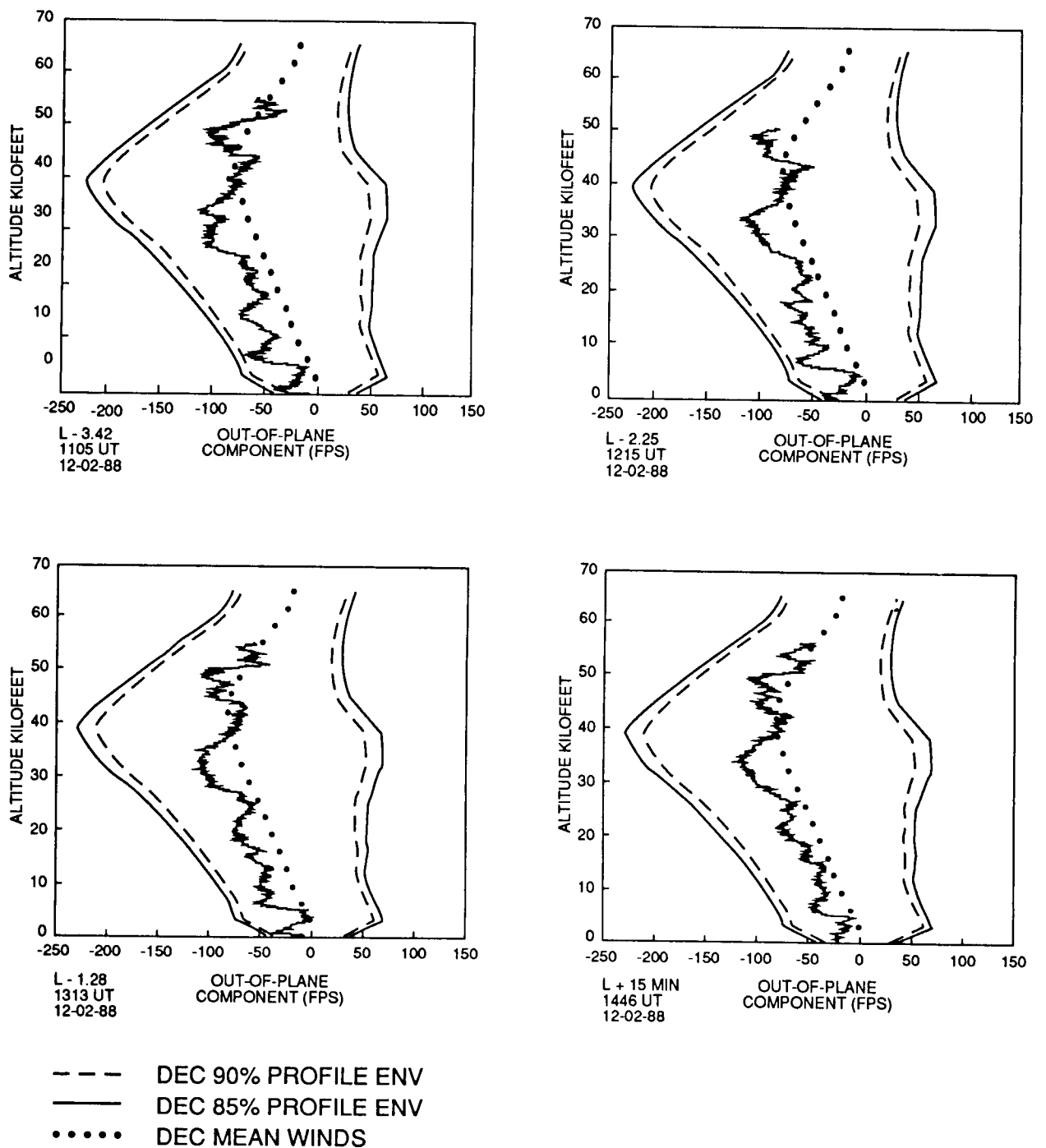


Figure 9. STS-27 prelaunch/launch Jimsphere-measured out-of-plane component winds (FPS).
Reference flight azimuth = 39 deg.

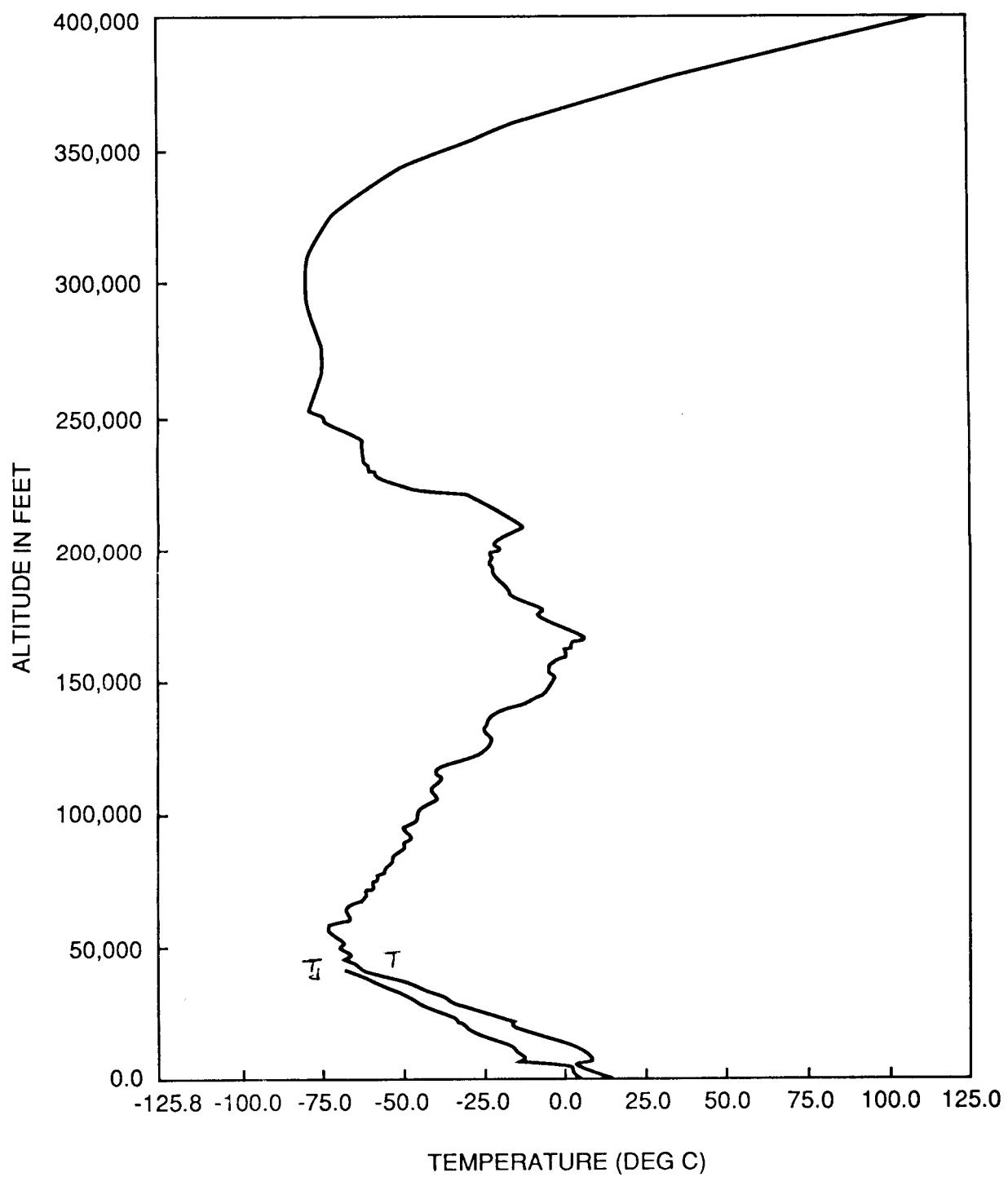


Figure 10. STS-27 temperature profiles versus altitude for launch (ascent).

REFERENCES

1. Saturn Flight Evaluation Working Group: Saturn Launch Vehicle Flight Evaluation Report – Appendix A – Atmosphere (A separate report is prepared for each Saturn vehicle launch operation). George C. Marshall Space Flight Center, Alabama.
2. Johnson, D.L.: Summary of Atmospheric Data Observations for 155 Flights of MSFC/ABMA Related Aerospace Vehicles. NASA TM X-64796, December 5, 1973.
3. Johnson, D.L.: Atmospheric Environment for ASTP (SA-210) Launch. NASA TM X-64990, February 1976.
4. Johnson, D.L., Jasper, G., and Brown, S.C.: Atmospheric Environment for Space Shuttle (STS-1) Launch. NASA TM 82436, July 1981.
5. Johnson, D.L. and Brown, S.C.: Atmospheric Environment for Space Shuttle (STS-2) Launch. NASA TM 82463, December 1981.
6. Johnson, D.L., Brown, S.C., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-3) Launch. NASA TM 82480, April 1982.
7. Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-4) Launch. NASA TM 82498, July 1982.
8. Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-5) Launch. NASA TM 82515, March 1983.
9. Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-6) Launch. NASA TM 82529, May 1983.
10. Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-7) Launch. NASA TM 82542, July 1983.
11. Johnson, D.L., Hill, C.K., Turner, R.E., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-8) Launch. NSAS TM 82560, October 1983.
12. Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-9) Launch. NASA TM 82572, January 1984.
13. Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-11) Launch. NASA TM 82580, March 1984.
14. Johnson, D.L., Hill, C.K., Jasper, G., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-13) Launch. NASA TM 82588, May 1984.

15. Johnson, D.L., Hill, C.K., Jasper, G., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-41D) Launch. NASA TM 86484, October 1984.
16. Johnson, D.L., Hill, C.K., Jasper, G., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-41G) Launch. NASA TM 86486, November 1984.
17. Johnson, D.L., Jasper, G., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-51A) Launch. NASA TM 84697, December 1984.
18. Jasper, G.L., Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-51C) Launch. NASA TM 86508, April 1985.
19. Jasper, G.L., Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-51D) Launch. NASA TM 86524, June 1985.
20. Jasper, G.L., Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-51B) Launch. NASA TM 86525, July 1985.
21. Jasper, G.L., Johnson, D.L., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-51L) Launch. NASA TM 86577, December 1986.
22. Jasper, G.L., Johnson, D.L., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-26) Launch. NASA TM 100359, March 1989.
23. Justus, C.G., et al.: The NASA/MSFC Global Reference Atmosphere Model – Mod 3 (with Spherical Harmonic Wind Model). NASA CR-3256, March 1980.
24. Turner, R.E. and Hill, C.K.: Terrestrial Environment (Climatic) Criteria Guidelines for Use on Aerospace Vehicle Development, 1982 Revision. NASA TM-82473, June 1982.

APPROVAL

ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-27) LAUNCH

By G. Jasper, D. L. Johnson, and G. W. Batts

The information in this report has been reviewed for technical content. Review of any information concerning Department of Defense or nuclear energy activities or programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

E. Tandberg-Hanssen

E. TANDBERG-HANSEN

Director, Space Science Laboratory

1. REPORT NO. NASA TM-100370		2. GOVERNMENT ACCESSION NO.		3. RECIPIENT'S CATALOG NO.	
4. TITLE AND SUBTITLE Atmospheric Environment for Space Shuttle (STS-27) Launch				5. REPORT DATE July 1989	
				6. PERFORMING ORGANIZATION CODE	
7. AUTHOR(S) G. L. Jasper, D. L. Johnson, and G. W. Batts*				8. PERFORMING ORGANIZATION REPORT #	
9. PERFORMING ORGANIZATION NAME AND ADDRESS George C. Marshall Space Flight Center Marshall Space Flight Center, Alabama 35812				10. WORK UNIT NO.	
				11. CONTRACT OR GRANT NO.	
				13. TYPE OF REPORT & PERIOD COVERED Technical Memorandum	
12. SPONSORING AGENCY NAME AND ADDRESS National Aeronautics and Space Administration Washington, D.C. 20546				14. SPONSORING AGENCY CODE	
15. SUPPLEMENTARY NOTES Prepared by Space Science Laboratory, Science and Engineering Directorate. *Computer Sciences Corporation, Huntsville, Alabama.					
16. ABSTRACT This report presents a summary of selected atmospheric conditions observed near Space Shuttle STS-27 launch time on December 2, 1988, at Kennedy Space Center, Florida. STS-27 carried a Department of Defense payload and the flight azimuth in this report will be denoted by reference flight azimuth, since the actual flight azimuth is not known. Values of ambient pressure, temperature, moisture, ground winds, visual observations (cloud), and winds aloft are included. The sequence of pre-launch Jimsphere-measured vertical wind profiles is given in this report. The final atmospheric tape, which consists of wind and thermodynamic parameters versus altitude, for STS-27 vehicle ascent has been constructed. The STS-27 ascent atmospheric data tape has been constructed by Marshall Space Flight Center's Earth Science and Applications Division to provide an internally consistent data set for use in post-flight performance assessments.					
17. KEY WORDS STS-27 Launch Atmospheric Summary Pressure Temperature Relative Humidity Winds, Winds Aloft, Clouds Space Shuttle			18. DISTRIBUTION STATEMENT Unclassified - Unlimited		
19. SECURITY CLASSIF. (of this report) Unclassified		20. SECURITY CLASSIF. (of this page) Unclassified		22. PRICE NTIS	
				21. NO. OF PAGES 42	